S.M. Oliva

COMPUTER CHRONICLES REVISITED

VOLUME 4

1986

A review of the PBS series that aired from 1983 to 2002.

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Computer Chronicles Revisited, Volume 4

1986

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Introduction

This ebook reprints a series of posts from my blog *Computer Chronicles Revisited*, which I launched in May 2021. Each chapter covers a single episode of the PBS series *Computer Chronicles* that aired during the first half of the show's fourth season (fall 1986). There is an extended recap of each episode followed by analysis of what became of the people and products featured on the program. Each chapter concludes with a section called "Notes from the Random Access File," an homage to the news segment that followed most *Computer Chronicles* broadcasts.

Chapter 1: Apple Classrooms of Tomorrow, Information Laboratory, Voyage of the Mimi, and The Factory

The fourth season of *Computer Chronicles* premiered in September 1986 with a two-part look at educational software. In this first episode, the focus was on software used by educators in the schools. The next episode focused on educational software for the home.

George Morrow joined Stewart Cheifet as co-host for both episodes. Also joining the two hosts for the introduction: a frog sitting in a small terrarium (and no doubt enjoying the hot studio lights). Cheifet said that when he studied biology in high school, they had to kill and dissect frogs like this one. Now you could use software to do the same thing. Cheifet demonstrated *Operation Frog*, a frog dissection simulator running on an Apple IIc. Chiefet noted that some critics argued this type of software was no substitute for the "real thing." Morrow disagreed. He said the software was a marvelous tool as a supplement, i.e., to do run-throughs and use as a reference tool.

And Now for the Apple Propaganda Portion of Our Program

Wendy Woods presented her first remote report, which might be more accurately described as a short promotional video for Apple and its "Apple Classrooms of Tomorrow" (ACOT) program. The segment included B-roll footage of third-grade students at the Stevens Creek Elementary School in Cupertino, California. This was one of the schools participating in ACOT, an Apple-funded "research project" that Woods said "could transform the role of computers in classrooms."

Woods said Apple provided enough hardware–Apple II computers–to give each student in the “study” a computer at both school and at home. Woods said in the classroom, the students spent part of their day learning about how computers work and how to use them. They also practiced math drills using game-like exercises.

But Woods said the “similarity with the usual school computer lab ends there.” The object of the ACOT program was to make computers a part of everyday school activities–another tool that was always present like a pencil or a blackboard. By integrating computers seamlessly into the daily routine, the project’s directors hoped to “profit” from the individual dialogue between student and machine–and interaction that put the focus of learning on the student. The kids moved directly into more powerful applications like word processing as a first step towards “self-motivated work.”

Woods said the “long-range” Cupertino project was one of seven demonstration sites around the country, which included both rural and city schools from third to ninth grades. Because of the project’s “unprecedented” approach, teachers would depend on trial-and-practice to decide how to incorporate the computer hardware into the curriculum. Finally, the school hoped to discover how to bridge the gap between the blackboard and the keyboard.

Educational Software a Growing Market, But Not Quite “Paying All the Bills”

Barbara Caligiuri and C. Mark Battey joined Cheifet and Morrow for the first of two round table segments in the studio. Caligiuri was the special projects coordinator with the Cupertino Union School District. Battey was a product manager with the publisher Addison-Wesley.

Cheifet opened by asking Caligiuri if the industry was investing adequate resources into educational software. Caligiuri said yes, although the perspective was changing considerably. She noted the State of California and other educational networks had been asking a lot of questions about software and were paying more attention to developing better software to meet their curriculum needs. Resources were always scarce but as the software improved people would spend more money.

Morrow asked Caligiuri if her district received a lot of support from the tech companies in the Cupertino area. Caligiuri said to a certain extent they were. But she added the educational software market for the schools was not as big or appealing as the market for educational software in the home.

Cheifet turned to Battey and asked how important the educational software market was to a publisher like Addison-Wesley. Battey said it was a very important market. He explained that Addison-Wesley was a “full-scale educational materials publisher,” and they approached software in that realm, i.e., how did it fit in with textbooks, video, and other technologies.

Cheifet followed-up, asking if there were a lot of schools interested in buying educational software. Battey said it was a growing market although it wasn’t “paying all the bills today.” Addison-Wesley was still primarily a textbook publisher.

Morrow asked about the process of selecting and editing software for publication and how it compared to, say, the traditional book market. Battey said he thought it was improving. Addison-Wesley didn’t treat software any differently in terms of the editorial process. All of the materials that came through the company went through the same detailed review process as books.

Cheifet asked Battey to demonstrate one of Addison-Wesley’s software products, *Information Laboratory: Life Science*. Battey said it was a “knowledge base” that let students practice critical thinking and problem solving while learning more about life science. For example, Battey selected information about the “Animal Kingdom” from the program’s main menu. The program then displayed what looked like a stack of index cards with a card titled “Animal Behavior” on top. On the left was basic text–and sometimes graphics–about the card’s topic. On the right there was a list of keywords and cross-references related to the topic. Cheifet asked what the target audience was for the product. Battey said it was designed for the middle school level, grades 7 thru 9.

Cheifet asked if this software was designed for students to use alone or along with a teacher and a textbook. Battey said Addison-Wesley provided teacher support materials including teacher guides and a series of “search sheets” that a teacher could give to students. But students could also conduct their own “unstructured” searching.

Morrow asked if there was enough room on floppy disks to present the information. Battey quipped they had squeezed as much in there as they could. Morrow asked about the possibility of CD-ROM. Battey said he expected this type of software would soon transition to CD-ROM given that you could get better graphics and more information onto a disc.

Cheifet next asked Caligiuri to demonstrate a piece of software used in her elementary school, *Reader Rabbit* from The Learning Company. (*Reader Rabbit* was previously featured in the 1985 Chirstmas Buyer’s Guide episode as one of Paul Schindler’s recommendations, so I’m not going to repeat anything with respect to how the program works here.) Caligiuri said they primarily used the program to help students who already knew some of the alphabet to improve their word skills. Cheifet asked what grade level *Reader Rabbit* was used with. Caligiuri said kindergarten or first grade, although it could also be used as a remedial program in second or third grade.

Following Caligiuri’s demonstration, Morrow asked her how you could tell whether or not the software had done its job. Caligiuri said one sign of student success was they started looking for more complicated games. You could also set *Reader Rabbit* to run faster and provide an additional challenge. Morrow suggested using a control group–giving one student a “placebo” and another the real software–to establish whether the software was useful. (George being George, he noted this software wasn’t cheap!) Caligiuri noted there was an “excitement factor” that went along with the child being able to get instant reinforcement from the software.

Shop Students Introduced to Computer-Aided Design

Wendy Woods returned for her second report, this time focusing on a shop class at Burlingame High School in San Mateo County. Woods said that anyone who has taken shop class can remember the process of drafting. But Burlingame was one of the few high schools now offering computer-aided drafting to students. By 1990, it's estimated that there would be 2.1 million jobs in the computer-aided drafting field. And Burlingame's students would be among the few prepared coming out of high school.

Phil DeRosa, a drafting instructor at Burlingame, said there was a "revolution" going on within the industry and right now the need for operators was growing. This was still a new technology, but DeRosa said that as the demand grew schools would need to find a way to supply the students.

Woods said Burlingame students still had to master the basics of drafting using pencil, paper, and a slide rule before graduating to the computer. But then the computer–which included a digitizer pad for drawing–allowed the student to create, modify, erase, and make a hard copy of their illustrations faster and easier than by hand. Although Burlingame's classrooms relied on Apple and IBM computers, Woods said that once students graduated they might go on to work on far more sophisticated systems.

The Socio-Economic Divide in School Computer Usage

For the final segment in the studio, Dr. Michelle "Mickey" Miller and Donna Hower joined Cheifet and Morrow. Miller was an assistant principal at the Luther Burbank Middle School in San Francisco. Hower was a computer specialist at Crocker Middle School in Hillsborough, California.

Cheifet asked Miller how her school–which was located in a city and had a high minority student population–fared with computers versus the schools located in Silicon Valley. Miller said her school had two computer labs. One lab consisted of Tandy TRS-80 machines that were purchased using federal funding. This lab specifically targeted students with low test scores. When Miller arrived at Burbank three years earlier, she realized that 20 percent of the students couldn't use this lab because their test scores were too high.

Paradoxically, computer-assisted teaching helped raise test scores, but that meant more and more students couldn’t access computers due to federal restrictions. So she started writing grants to set up an Apple II computer lab that more students could use.

Morrow asked if the students were becoming more computer literate. Miller said no, computer-assisted instruction didn’t really make you more computer literate. The computers were mostly used for “drill and practice” instruction. But it helped for the computer to give “one-to-one” feedback to the student.

Cheifet then asked Miller to demonstrate a program she used with her students, *Voyage of the Mimi*. Miller explained that *Mimi* was a “multimedia computer package.” She demonstrated one part of the program, an ecology lesson that taught students about survival. Just to step outside of the recap for a moment, *The Voyage of the Mimi* started out as a 13-episode television series produced by Bank Street College of Education. The series portrayed a group of scientists traveling on a research boat called the *Mimi*. Each episode focused on a particular scientific principle. The *Voyage* software was meant to be used in conjunction with the series.

For example, the ecology lesson that Miller demonstrated tied in to the ninth episode of the television series, where the cast was shipwrecked on a desert island for 12 months. In the software, Miller said the students had to identify what the crew would eat by reconstructing the island’s food chain. For example, the student could select a bear as a source of food. The program then helped the student understand what animals and plants the bear needed to eat, and so forth.

Cheifet turned to Hower, who taught in a wealthier school district in Hillsborough. How was her school using computers? Hower noted her school had its first computer lab back in 1977, which included TRS-80 computers. In a reverse of Miller’s situation, Hower said her school got funding for its computer lab due to the high number of “gifted” children. Since then, the school had organized a second, Apple II-based lab, based on grant funding. Currently, there were 15 computers in the Apple lab, 17 in the TRS-80 lab, and another 8 or 9 computers in individual classrooms. She said the English teachers used computers for word processing and creative writing. The social science teachers also used computers for term papers.

Cheifet returned to Miller's *Mimi* demo. At this stage in the "shipwrecked" program, the player had to assign tasks, such as hunting and fishing, to various members of the stranded scientist team. The player then had to move the various characters around the island to carry out their assignments.

Echoing one of Morrow's questions from the previous studio segment, Cheifet asked Miller how she went about evaluating software like *Mimi* to determine what to buy and if it was any good. Miller said there was a tech center for the city that recommended software to the school district. She noted that *Mimi* came highly recommended, although it was "very expensive."

Hower then presented the final demo for the episode, a program called *The Factory*. Hower explained this was a problem-solving program that taught a student to break down a problem into pieces and organize them to create a "product." Essentially, *The Factory* showed you a finished image and the user needed to identify the steps to recreate that image using "machines." Cheifet asked where this type of program was used in the curriculum. Hower said it was used specifically in mathematics. She also used it in a dedicated problem-solving class.

Cheifet asked both guests if every student needed a computer at home. Miller said no. Hower said 70 percent of her students had computers at home. Miller said only 1 percent of her students did.

Compaq Beat IBM to 386 Release

Stewart Cheifet presented this episode's "Random Access" segment, which was recorded in September 1986.

- Compaq officially unveiled its new 386 Deskpro computer using the Intel 386 CPU. The new Deskpro would come in two models, the Model 40 and Model 130. (The numbers indicated the hard drive size in MB.) Compaq said its new machine would run most software 2 to 3 times faster than an IBM PC-AT. Cheifet noted the 386 Deskpro ran at 16 MHz, could execute approximately 2 million instructions per second, and came with 1 MB of RAM. Compaq claimed the Deskpro was compatible with most existing IBM PC software. The company also planned to release a Xenix-based operating system for the Deskpro in early 1987.

- IBM had still not announced its own plans for a 386 computer. Cheifet said there were rumors IBM had a machine ready to go but canceled a planned announcement at the last minute.
- At the first-ever Desktop Publishing Conference, more than a dozen vendors introduced new programs targeting MS-DOS machines as opposed to the Macintosh.
- At the Computer Futures Conference in New York, analysts offered conflicting views of the industry's immediate future. Cheifet said many analysts at the conference believed there was "little hope for a rebound" from the computer industry's slump. McGraw Hill, however, said second quarter (1986) figures showed the industry was "slowly breaking out of the slump." Standard & Poor's, however, predicted a "prolonged electronics recession" and expected to continue downgrading the debt rating of leading tech companies.
- Paul Schindler reviewed *Word Finder* (Writing Consultants, Inc., $80), a RAM-resident thesaurus program that contained 220,000 synonyms and worked with most word processing programs for the MS-DOS platform.
- Tandy reported delays in its new 1000 EX computer due to problems with FCC certification. The Tandy 1000 SX received its certification earlier in the month. (The EX finally came to market in December 1986.)
- A Senate subcommittee approved a proposed electronic privacy act. Republican Sen. Wiliam Cohen of Maine also introduced a bill to regulate computer matches by the federal government.
- Retired Adm. Bobby Inman, a former deputy director of the CIA, resigned as chairman and CEO of Texas-based Microelectronics and Computer Technology Corporation (MCC). Cheifet said Inman wanted to focus more on the "manufacturing and marketing side of the industry."

- Apple was trying to track down the source of recent product leaks. (Some things never change!)
- A British company announced a new 386-based computer running MS-DOS with 4 MB of RAM and a 70 MB hard disk for under $4,500. It turned out to be a hoax. (To put this in context, that Compaq Deskpro 386 mentioned earlier cost $6,500 and came with 1 MB of RAM and a 40 MB hard drive standard.)

Building Long-Term Brand Awareness Through Copious Use of Tax Credits

The Apple II was the real star of this episode. All of the programs demonstrated on-air ran on an Apple IIc. And as Wendy Woods' first segment made clear, Apple was heavily invested in the educational market during the 1980s.

This was part of Apple's long-term strategy dating back to the company's early days. In 1980, Jobs conceded to the *New York Times* that computers were still primarily sold to hobbyists and professionals and that a "truly mass market for personal computers would not emerge until the end of the decade." And one way to build that mass market was to introduce personal computers into the elementary schools.

Even before Apple went public in 1980, Jobs and the Apple team focused on educational sales. In 1978, Apple won a contract to supply 500 Apple II computers to the Minnesota Education Computing Consortium (MECC). That may not sound like much, but the Apple II had only been introduced in 1977 and competed against the Commodore PET and the Tandy TRS-80, both of which were produced by more established companies. (Apple only sold about 8,200 computers altogether in 1977-1978, during which time Tandy sold 250,000 units through its Radio Shack stores.)

As the Apple II gained acceptance in the business market during the early 1980s, Jobs led a concerted lobbying effort to alter federal and state tax laws in order to make it financially palatable for Apple to "donate" more computers to public schools. In 1983, the company launched a program it dubbed “Kids Can’t Wait.” Our old friend Ken Uston wrote about this campaign for the October 1983 issue of *Creative Computing*:

> The primary objective of the program is to place an Apple IIe computer system in each of the roughly 9250 eligible elementary and secondary schools in California. (Schools with fewer than 100 students do not qualify for the program.)
>
> Apple tried earlier, in vain, to originate a similar program on a national level. Apple’s chairman, 28-year old Steve Jobs, ran into U.S. Congressman Fortney “Pete” Stark on an airplane flight. The two found themselves discussing student computer literacy and tax exemptions for companies donating computers to schools.
>
> As a result of this encounter, Stark introduced a bill in 1982 in the House of Representatives providing for substantial tax credits for contributing companies. The bill allowed tax deductions based on fair market value, rather than cost, which could not exceed 200% of the cost to donors. Apple representatives calculate that, based on the maximum 46% federal corporate tax rate, the contributing companies would end up paying about 8% of the cost of donated equipment.

The federal proposal died in the Senate during the 1982 post-election session. But Jobs found more success in Sacramento, where the California legislature approved an 18-month tax credit of 25 percent for companies that donated computer equipment to public schools. Apple then agreed to donate one free Apple IIe system to 9,250 California public schools. According to Uston’s math, if every school accepted the free IIe, Apple would get a tax credit of about $4 million after donating $5.2 million in products.

Giving free computers to schools was also a key part of the Apple Classrooms of Tomorrow (ACOT) program discussed by Wendy Woods during the episode. ACOT was billed as a “research study” designed to examine the impact of computers on teaching and learning. Apple launched ACOT in 1985 at five different schools throughout the United States. Researchers at the University of California, Los Angeles, then conducted a series of “evaluation studies” of the sites between 1987 and 1990.

Of course, Apple took full advantage of ACOT for propaganda purposes. In a full-page ad for the 1988 AppleFest show in Boston, a faux news article touted the "success" of ACOT while being vague about the specifics:

> ACOT administrators don't speak in terms of test scores, but rather in the long-term impact this program has on students who will mature through several grade levels of constant computer access and use.
>
> Local ACOT teachers, however, enthusiastically point to the immediate effects of the program. Many report that students are writing better, more creatively and more often. Math and reading skills have also improved dramatically.

When the UCLA researchers published their final report on ACOT in 1993, the findings were inconclusive. The authors noted that ACOT was "implemented in a relatively small number of classrooms, often only one at a particular grade level," and local schools often made year-to-year changes that effectively rendered it impossible to make meaningful comparisons in student performance. But in general, the authors said that ACOT students "had at least maintained their performance levels on standard measures of educational achievement in basic skills and had sustained positive attitudes."

As for the teachers, they were "reasonably satisfied with their students' progress" yet many of them "were not convinced that computer use helps students stay on task, or that students cheat less when using instructional software than when working in a workbook."

Apple continued the ACOT program until 1995. The company was happy enough with the results–or at least the PR value–to launch a successor, ACOT2, in 2008, which focused on pushing Internet and mobile devices into the schools.

Notes from the Random Access File

- This episode is available at the Internet Archive and has an original broadcast date of September 12, 1986.

- This was the first episode of the fourth season of *Computer Chronicles*. Leading Edge Hardware Products, a Massachusetts-based manufacturer of PC clones and peripherals, was the new presenting sponsor. McGraw Hill, the publisher of *Byte*, also continued its sponsorship.
- The only format change to the program between seasons was the elimination of the end-of-episode commentary originally provided by Paul Schindler and later by George Morrow.
- Barbara Caligiuri retired from teaching in the Cupertino Union School District in 1993.
- C. Mark Battey remained with Addison-Wesley until 1990. He spent the 1990s as managing director of Essex Environmental. Battey entered politics in the early 2000s, working on venture capitalist Steve Westly's successful 2002 campaign for California State Controller. Battey served as Westly's chief deputy from 2002 to 2003. Battey then had a brief stint as a trustee of the California State Teachers' Retirement System. In 2005, then-Gov. Arnold Schwarzenegger fired Battey and two other trustees after they refused to back his plan for privatizing the system. In 2012, Battey and his wife started Miarmar Farms in San Mateo County, which they continue to run today.
- Mickey Miller remained with Luther Burbank Middle School until 1989, when she became the principal of Potrero Hill Middle School in Los Angeles County.
- Donna Hower continued to teach in the Hillsborough schools until her retirement in 2010 after 34 years with the district.
- In 1994, President Bill Clinton nominated Bobby Inman to serve as Secretary of Defense. Inman later withdrew from consideration after blowing up at a *New York Times* columnist who criticized his record. Coincidentally, a couple years later Clinton named Maine Sen. William Cohen as defense secretary.
- *The Voyage of the Mimi* game for the Apple II was published by the software division of Holt, Rinehart and Winston, which as I discussed in a previous post was at one point a subsidiary of CBS. In an unrelated note, the *Voyage of the Mimi* television series featured a young Ben Affleck in one of his first acting roles.
- *The Factory* was originally developed by Human Engineered Software, which as I previously discussed should not be confused with

Human Edge Software.

Chapter 2: First Shapes, InfoMinder, The Name Game, PLATO, and the Electronic University Network

The second part of *Computer Chronicles*' fourth-season look at educational software was something of a grab bag. The September 1986 episode looked at everything from software targeting preschoolers to early efforts at offering college classes online. There was even a return of our old friend the LaserDisc!

Stewart Cheifet opened the program by showing guest co-host George Morrow the VTech Learning-Window Teaching Machine, a “toy computer for kids” that parents could purchase for under $50. It taught kids math and spelling using a voice synthesizer. Cheifet noted that computers had been blamed for putting people out of jobs. Did Morrow think computers could be used effectively to train people for new jobs? Morrow said that he spent a lot of time with user groups and the professionals were using computers now as a transitional tool. The challenge for the industry was putting some “entertainment” into these products to help people make that transition.

Taking College Classes from Your Home (or Horse Ranch)

Wendy Woods presented her first remote segment from the AAG Ranch, a Peruvian horse ranch located in Pleasanton, California, about 35 miles from San Francisco. Woods wasn’t there to talk about horses but rather profiled Lourdes Giovannini, who worked at the family-owned ranch while raising two children, working a job in the city, and taking online college classes through the Electronic University.

Woods said using a modem and software provided by the Electronic University, Giovannini could follow her lessons in business law on her own time, either from home or at work. The course was personalized to her level of prior study. Lessons appeared on the screen much like a traditional online tutorial. But the course was closely based around a textbook.

Like any online database, Woods said, the Electronic University provided students with information resources. But alongside a standard encyclopedia and reference database, the communications link was interactive, much like an electronic bulletin board. Giovannini took her exams on the computer and found out the results about 48 hours later. If she wanted to consult her teacher she could ask to set up an online appointment.

Woods said that educational telecommunications services were clearly limited in their course offerings, although some now offered master's degrees. But for students faced with time constraints–and adult responsibilities–the opportunity to pursue higher education over a telephone line was a reward in itself.

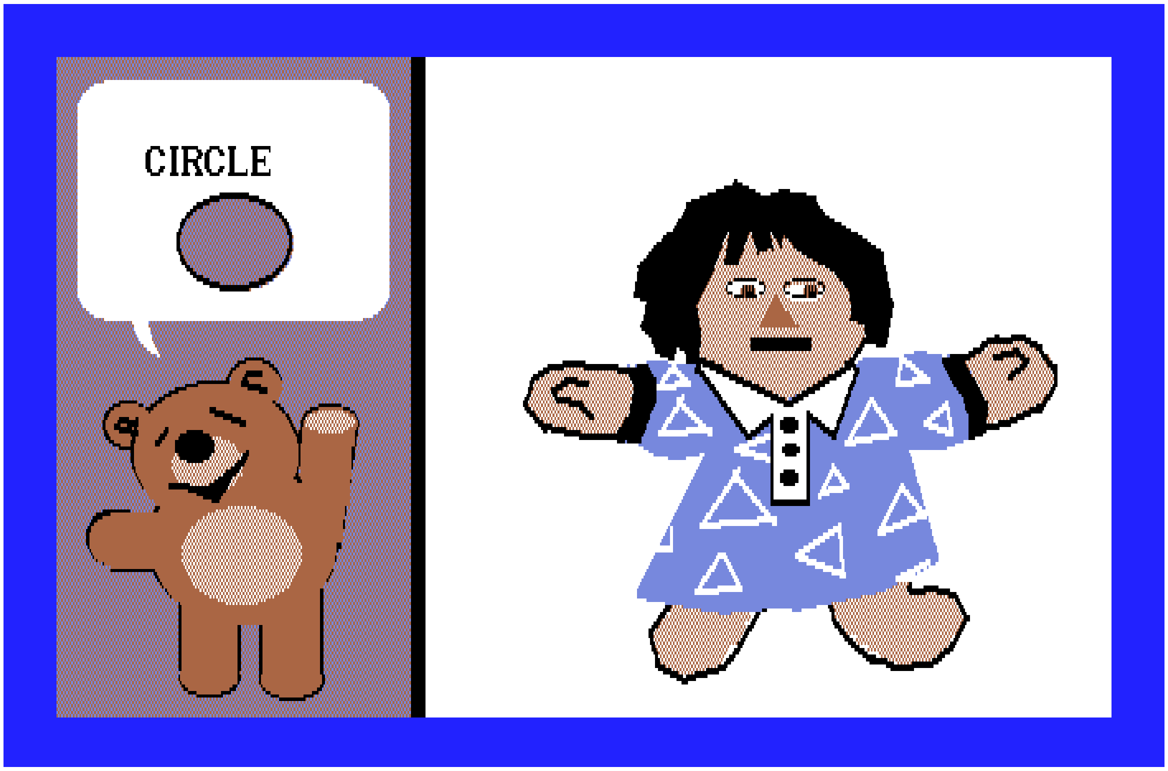
From Basic Shapes to Fine Art

Mary Cron and Jim Becker joined Cheifet and Morrow for the first studio round table. Cron was vice president of educational products with First Byte, a software publisher. Becker was president of Terrapin Software.

Cheifet opened by noting that in the previous program, they discussed educational software in the schools. Today the focus was on software for the home. Cron's company produced software for preschoolers. Could kids really handle working with a computer and software when they were just 4 or 5? Cron said yes, and one of the reasons was the advances in interfaces, such as the mouse. The program she was there to demonstrate, *First Shapes*, only used the mouse for input. So for the child it was a matter of moving the mouse and pressing the button. They didn't require any keyboard skills.

Morrow asked how the child benefited from this. Cron said the benefits were educational, such as learning geometric shapes while having fun. The computer was a tool that kids could use to experiment with just like they used colored crayons or paints.

Cron then demonstrated *First Shapes.* In this program, children used geometric shapes to build toys on the screen. This program used voice synthesis technology called *SmoothTalker*, which was also developed by First Byte, to instruct the child and give feedback.



A sample image created by the program “First Shapes” using an Apple IIgs emulator. On the right side of the screen is the image of a child’s doll with a blue dress decorated by triangles. On the left side a bear is “speaking” by identifying the shape of a circle.

Cheifet asked Cron about the importance of using speech synthesis in preschool software. Cron said having an auditory component in an educational environment was important, because some kids didn’t learn unless they could “also hear it.” Cheifet jokingly asked if Cron was worried if kids would end up mimicking the synthesized speech and sounding like the computer. Cron said she wasn’t concerned.

Abruptly shifting gears, Morrow turned to Becker and asked for a demonstration of his company’s product, *InfoMinder*, which was a LaserDisc-based information system running on an Amiga. Becker explained that optical storage allowed you to store a large amount of information. *InfoMinder* provided a consistent and easy way to find information contained on that optical storage.

Becker demonstrated by using *InfoMinder* to access a database of information about the National Gallery of Art in Washington, DC. You could access information about paintings from different time periods located at the gallery. For example, Becker entered a search for “Flemish paintings,” and the software called up specific frames from the LaserDisc that contained matching results. The user could also set the matching images to run as a slideshow.

Morrow clarified that *InfoMinder* overlaid LaserDisc storage with an information access method. Becker said yes, and he emphasized that the LaserDisc component was just a “small aspect” of the program. The LaserDisc was the “resource.”

Morrow asked if *InfoMinder* could build an access network that showed the progression of certain schools of art. Becker said you could organize the information any way that you wanted. The system came with its own authoring language and compiler. This allowed you to build a tool to access information in a rapid way. It was simply a matter of how you chose to organize the information. For instance, this particular resource organized the paintings by the names of the painters, e.g., Pablo Picasso.

The “Learning Tool of the Future”

Wendy Woods returned for her second and final remote segment, this time from the Stanford University Medical Center. Woods narrated some B-roll of what she called the “ultimate video game,” or at least the best example of educational software–a videodisc-based training program for medical students. The program, made by San Diego-based Intelligent Images, used video footage and required students to choose the steps necessary to save the life of a stabbing victim. The student used a touchscreen to choose an option. The LaserDisc system then showed the outcome of that choice. If the student made the wrong choice, Woods noted, then the patient “died.”

Dr. Marc Nelson of Stanford noted this tool gave the students “immediate feedback” and a chance to manage a patient’s case, which was typically something they wouldn’t do until very late in their careers. Ann Brewer, a media librarian with Stanford, added that a lot of hospitals and universities were interested in obtaining a similar videodisc-based training system for themselves. She said this was the “learning tool of the future.”

Woods said interactive video also provided the flexibility to fit into the mostly hectic schedules of medical students. Most importantly, these lessons were perfectly suited to this medium. If a student made the wrong choices, they could go back and try again. Real life in the emergency room was not as forgiving, she noted.

These Early FMV Games Were Wacky

Mark Patterson joined Cheifet and Morrow for the next segment. (Jim Becker also stuck around.) Patterson was the founder and president of MindBank, Inc., a Pittsburgh-based software developer. Continuing our videodisc theme, Cheifet noted that Patterson's company had a program called *The Name Game*.

Patterson explained his software was focused on business training. He noted that one of the most important skills for a business executive, manager, or salesperson to learn was remembering names. *The Name Game* taught these skills by offering a simulated environment, in this case having the player be an "undercover agent" attending a party at the U.S. embassy in France. As the player mingled in that party, they met hundreds of people. There was a suspected "deadly plot" and the player's ability to remember the names of these people was the key to stopping it.

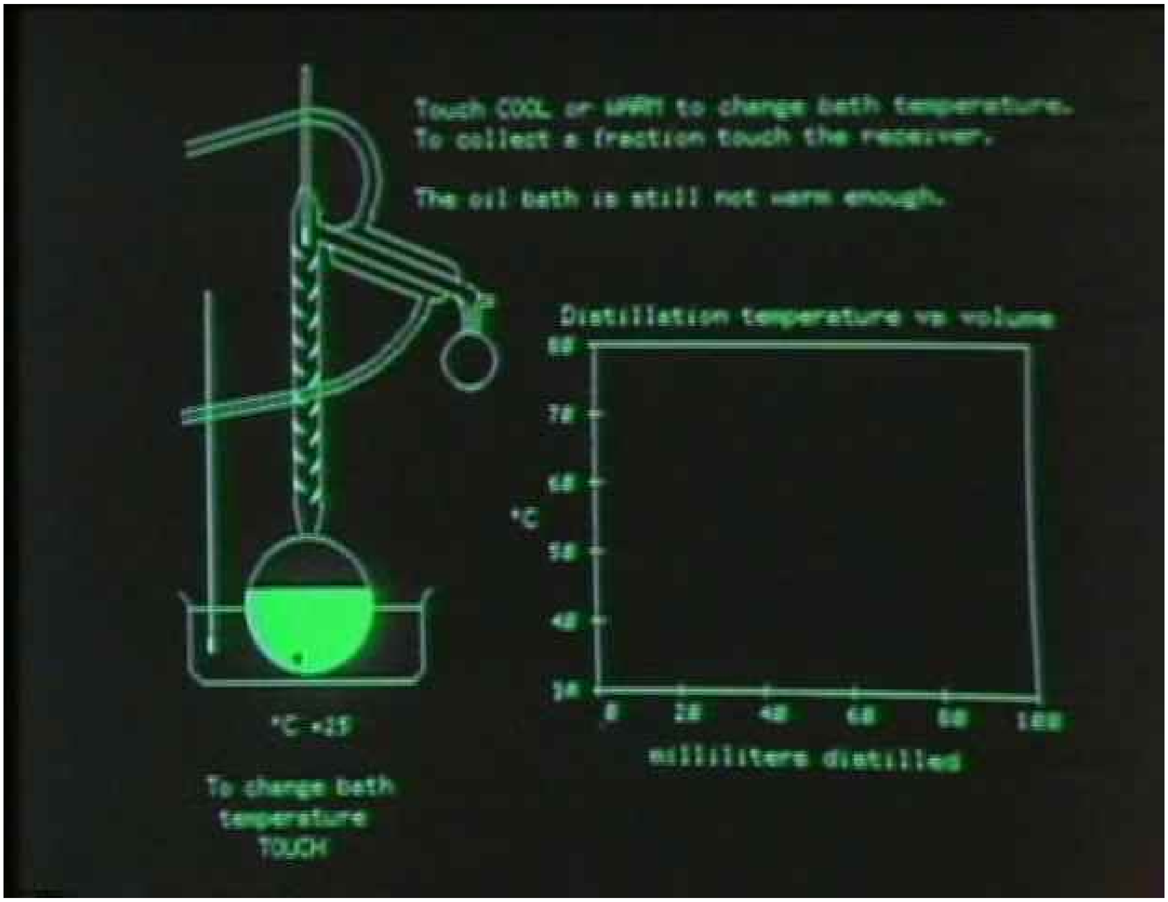
Patterson ran some footage of the game. At random intervals the player would need to recall the name of a particular character from the video footage. If you typed in the wrong name, the character would give you a short lecture about the importance of remembering names.

Morrow asked Patterson about MindBank's other products. Patterson said they had a whole series of courses on everything from sales management to supervisory skills and technical skills. They were all interactive simulations like *The Name Game*.

From Mainframes to Micros and Back to Mainframes?

The final segment began with Cheifet talking to Luba Lewytzkyj, who worked in educational marketing with Control Data Corporation (CDC). Cheifet asked Lewytzkyj to explain the PLATO system, which CDC had been marketing for a long time. Lewytzkyj said PLATO was a highly interactive, graphics-based computer education program system. It was "self-paced" and tailored to the needs of individual students.

Lewytzkyj showed an example of a PLATO terminal connected to a chemistry lab experiment (see image below). It was a simulation of a fractional distillation experiment. The student would have already used the touchscreen interface to assemble the distillation apparatus beforehand. The objective was to heat the still and obtain a mixture of two chemical compounds. If the student did not enter the correct inputs the simulated experiment would “overheat” and fail. Overall, Lewytzkyj said the PLATO system allowed the student to prepare and understand how to function in a laboratory environment.



Touch COOL or WARM to change bath temperature.
To collect a fraction touch the receiver.

The oil bath is still not warm enough.

To change bath temperature TOUCH

A simulated experiment run on the PLATO system. There is an image of a beaker on the left and a graph showing the temperature and volume of the liquid contained in the beaker on the right.

Cheifet asked Lewytzkyj to show how PLATO was also used for foreign language instruction. Lewytzkyj demonstrated using Russian. She said there were several hundred hours of materials available on PLATO for a variety of languages, including French, German, and Spanish.

Cheifet noted that PLATO started out on mainframe computers but later moved to microcomputers. Now there was talk about going back to mainframes and modems. Why? Lewytzkyj said that was primarily because schools and homes didn’t have the communications capabilities–such as electronic mail–and lacked the resources to find out how well the student was actually doing on a lesson.

Lewytzkyj then pulled up a Russian lesson on PLATO developed by the University of Illinois. It offered a vocabulary test. The student could also bring up a Cyrillic character set on the touchscreen.

Cheifet and Lewytzkyj then joined Morrow and James Milojkovic back on the main set. Milojkovic was vice president for educational research and development with TeleLearning Systems, Inc., the company behind the Electronic University Network (EUN) profiled during Wendy Woods’ first segment.

Cheifet asked Milojkovic to explain EUN and what it did. Milojkovic said the network connected the personal computers of students to the personal computers of instructors across the country. Cheifet asked if these were “traditional” students or just students going to school on their computers. Milojkovic said they were students who wanted to pursue a degree program and wanted to do so from home.

Milojkovic asked about the time and costs of the EUN. Milojkovic said students paid an enrollment fee to the network and a per-course price that depended on the tuition charged by a particular university. Basically, the student could then take the course at their own pace.

Morrow asked how university faculty actually viewed programs like EUN and PLATO. Lewytzkyj said faculty was becoming more receptive, particularly when they took an active role in helping to develop the computer-assisted instruction material. Milojkovic said EUN followed a different model. They based the development of courses on “master teaching techniques.” This meant EUN directly connected the student to the teacher as opposed to providing a prepackaged lesson like PLATO.

Cheifet asked Milojkovic for a demonstration of the EUN software. Milojkovic explained it was a menu-driven system. Students received messages, lessons, and project assignments from the instructor. Morrow asked how quickly a student could get a response from an instructor to a question or assignment. Milojkovic said instructors were expected to respond within 24 hours or no later than 2 days.

Cheifet asked Lewytzkyj about the future of computers in education. Would we see a massive increase in their use? Lewytzkyj said there would be a greater use of computer-assisted instruction, particularly as the programs became more interactive and provided the kind of individualized instruction that students needed in a non-traditional environment.

Apple Set to Debut “Yuppie” IIgs

Stewart Cheifet presented this week’s “Random Access” segment, which he recorded in September 1986.

- The new Apple IIgs was due in stores any day now. The basic machine would sell for just under $1,000 and include 256 KB of RAM and enhanced graphics and sound modes. Cheifet noted the IIgs had two high-resolution graphics modes and could handle 15 voices simultaneously through its custom sound chip. Apple said the IIgs was compatible with “most” Apple II software. The company would also sell an upgrade kit for the Apple IIe that turned it into a IIgs. That upgrade would cost $500.
- The full Apple IIgs system with a disk drive and color monitor would cost around $1,800. Cheifet noted the machines were being built in Singapore and the first 50,000 units would carry the signature of designer and Apple co-founder Steve Wozniak.
- Cheifet said early reviews of the IIgs were positive, although some reviewers said the graphics were not as good as the Amiga. Meanwhile, Atari said the “high price” of the IIgs did not make it a serious threat to its 1040ST. Indeed, Atari President Sam Tramiel dismissed the IIgs as a “yuppie machine.”
- Atari Corporation was reportedly planning to go public with a $50 million stock offering.
- IBM slashed prices on PCjr software and accessories. Cheifet noted there were about 400,000 existing PCjr users. The price of the PCjr version of *Lotus 1-2-3* was reduced from $300 to $99.
- IBM also announced it would reduce its workforce by several thousand people through a new “retirement incentive program,” allowing the company to maintain its traditional “no layoffs” policy. Cheifet said Hewlett-Packard was doing the same thing, using a voluntary retirement program to eliminate 1,500 positions.
- Lotus planned to start sales of *Lotus 1-2-3* in Japan, targeting the NEC 9800 computer and the IBM 5550 series.
- *Online Access Guide*, a new bimonthly magazine for modem users, was due out later in September 1986.
- Paul Schindler reviewed *Q-DOS* (Gazelle Systems, $30), a DOS file manager program that displayed a diagram of directories and subdirectories.
- Computer scientists at the University of Florida were working on the “mind link,” i.e., a way to have computers communicate directly with a human brain.

- Harvard University professor Anthony Oettinger coined the term “compunications,” a combination of computer and communications. Etinger predicted the term would describe future combinations of computer and communications companies, such as “IBMCI” (IBM + MCI) and “AppleT&T.”
- A new study of bulletin board users found there were about 400,000 regular BBS users in the United States and about one-third of them now used 2400 baud modems. The average BBS received 45 calls per day.
- Operators of France’s Minitel system were concerned about the growing popularity of prostitution and pornography on the online system.

MindBank Struggled as Videodisc Market Failed to Take Off

As I noted in my introduction, this episode was something of a grab bag without a coherent theme. So I’ll briefly focus here on just one guest, Mark Patterson of MindBank, Inc. Patterson got his start in the business quite young. In fact, he founded MindBank in 1982 while still studying for his MBA at Carnegie Mellon University in Pittsburgh. Patterson told *The Pittsburgh Press* in June 1983 that he started MindBank primarily to develop computer-based training systems for the banking industry. But he didn’t have an actual product at this point.

A lack of product didn’t prevent Patterson from attracting capital. A few months later, in October 1983, the *Press* reported that Patterson had raised $625,000 for MindBank thanks to assistance from the Enterprise Corporation, a nonprofit startup fund established by Carnegie Mellon and the University of Pittsburgh. Fast forward to August 1986, and MindBank finally sold its first six computer training courses at $2,400 apiece to a Milwaukee insurance company. Accounting giant Price Waterhouse also announced it would work with MindBank to develop a “series of financial and general management videodisc training courses.” MindBank now employed 13 people and Patterson predicted product sales of $1 million by the end of 1986, according to the *Press*.

With Price Waterhouse’s backing, MindBank also established a training center in downtown Pittsburgh in late 1986. Dubbed the “Mastery Center,” the *Pittsburgh Post-Gazette* reported MindBank planned to offer 15 on-site courses (at rates of $300 to $500 per student) with another 48 promised by the end of 1987. The *Name Game* demonstrated on *Computer Chronicles* was one of these courses. Patterson claimed it cost about $250,000 to develop each course.

When Patterson appeared on the show, he was still publicly bullish on the future of videodisc-based training programs. This didn't last long. By June 1988, MindBank struggled with cash flow problems. The *Pittsburgh Press* said Patterson was forced to cut his staff by half and close the Mastery Center. A planned interactive budgeting course–another part of the Price Waterhouse joint venture–was 18 months behind schedule. One ex-employee told the paper they were "very surprised" that MindBank was even still in business.

Patterson maintained an optimistic tone but conceded to the *Press* that "the videodisc market never did take off like many people said it would." (Presumably, Patterson was one of those people.) He blamed the expense of the videodisc system itself, which still cost about $10,000 in 1988.

About a year later, in May 1989, the *Press* reported that MindBank had started to rebound, thanks largely to its new Real Estate Management System (REMS), a $25,000 hardware-software for interactive property management. MindBank developed REMS under a $110,000 contract from the Greater Chicago Water Reclamation District, which used REMS to "manage several hundred properties over a 20,000-acre area," according to the *Press*. Patterson said REMS helped turn MindBank into a profitable corporation for the first time ever in late 1988.

While the news reporting on MindBank dried up after the late 1980s, the company still exists, at least according to Pennsylvania records. As best I can tell, Patterson continued running MindBank as essentially a software consulting business during the 1990s. Patterson himself relocated to Virginia at some point. In recent years he launched another startup called Brainfire.

Notes from the Random Access File

- This episode is available at the Internet Archive and has an original broadcast date of September 18, 1986.
- Luba Lewytzkj had a long career in sales and marketing after leaving Control Data Corporation, working at Pearson, Microsoft, and Atomic Learning among other companies. Since the 2010s she's worked as a consultant based out of Minnesota.
- The AAG Ranch seen in Wendy Woods' first report discontinued its horse breeding operation in 1988. The Giovanni family later opened the La Equestrian Center in 2000, where Lourdes Giovanni is still the on-site manager, according to the center's website.

- The First Byte, Inc., was incorporated in 1982. During the mid-1980s, First Byte published a number of educational titles, which were distributed by Electronic Arts. But First Byte was probably best known for its speech-synthesis software *SmoothTalker*, which was available on a number of 16-bit machines. The company later shifted towards speech synthesis for MS-DOS computers. Davidson & Associates, a major player in the educational software market at the time, acquired First Byte in December 1992.
- Mary Cron apparently left First Byte later in 1986 to start her own software company, Rymel Design Group, which produced titles such as *Davidson's Kid Keys*, an animated typing tutor program for elementary school children that was published by Davidson & Associates. According to a 1994 *Newsweek* profile, Cron's company employed mostly female software artists and designers. Based on California corporate records, Rymel remained in business until around 1999.
- I didn't find much about Jim Becker or his company Terrapin Software. *InfoMinder* was distributed as a commercial product by a Texas-based company, Byte by Byte (not to be confused with First Byte). Bob Lindstrom noted in a December 1986 review that *InfoMinder* was "one of the few" native applications produced for the Amiga at that point. Byte by Byte was "advertising the product as an ideal gateway to CD-ROM-based information," and Lindstrom agreed that "*InfoMinder* has potential in a wide variety of information storage and retrieval applications."
- The PLATO system's appearance on *Computer Chronicles* actually occurred fairly late in the system's life. The original PLATO was created at the University of Illinois back in 1960. The commercial rights to the system were licensed to Control Data Corporation three years later, in 1963. Jimmy Maher of the *Digital Antiquarian* offered a good overview of PLATO and CDC's role in marketing the system in a 2012 post.
- The Electronic University Network (EUN) was the brainchild of Ron Gordon, whose biggest prior claim to fame was his stint at the original Atari, Inc., under Nolan Bushnell. Gordon joined Atari in 1972 to head up its international marketing operations and briefly served as the company's president from 1974 to 1975, leaving prior to the sale of Atari to Warner Communications. He launched TeleLearning Systems, the parent company of EUN, in 1982. EUN actually continued well into the 1990s, eventually offering its courses through America Online. In 1998, EUN merged into Durand Communications. Ernie Smith of Tedium published a more detailed article in 2019 about TeleLearning and EUN's legacy in the online education market.

- Atari Corporation did go public on November 7, 1986, selling 4.5 million shares at $11.25 each, for a total offering of $50.6 million. Jack Tramiel and his family still retained 53 percent of the company. Warner Communications, which sold the home video game and home computer assets of the original Atari, Inc., to Tramiel in July 1984, was still the second-largest shareholder of Atari Corporation at the time of the public offering.
- I wonder if France ever managed to lick that whole “people using computer networks to look at porn” problem.

Chapter 3: The Music Studio, EZ-Track, Soundscape, the Apple IIgs, and the CompuSonics DSP-1000

The Battle of the 16-Bit Computers was in full swing by late 1986, with the Apple IIgs joining the fray against the Commodore Amiga and the Atari ST at the lower end of the market. One of the key fronts in this battle was sound–specifically, the ability of these newer machines to produce digital music. Computer music was still in its infancy but had taken a significant step forward thanks to the development of a new standard called MIDI, which was the focus of this September 1986 episode of *Computer Chronicles*.

Instead of hearing the usual *Chronicles* theme music as the show faded in for the introduction, there was an automated tune playing on a Casio SK-1 keyboard in the studio. Cheifet noted that computer keyboards had come a long way in the two years since the previous *Chronicles* episode on computer music back in season one. For example, the Casio keyboard cost about $100 and came with a built-in synthesizer capable of digital sampling.

Cheifet said one reason that computers and music had moved along so quickly was the establishment of the MIDI standard. Gary Kildall–making his fourth season debut–reiterated his long standing belief that the entire personal computer industry was based on standards, such as the floppy disk, RS-232 connectors, the IBM motherboard, et cetera. The MIDI standard would similarly lead to a bunch of new applications.

A Brief Introduction to MIDI (on the Macintosh)

Wendy Woods presented her first remote report from a recent expo featuring computer music. She profiled Gary Leunberger, a musician and composer who used a synthesizer to “mimic” traditional instruments–and invent a few new ones as well. The equipment that made this possible was a combination of hardware and software that communicated with the synthesizer via a musical instrument digital interface (MIDI) port.

Woods said the process began on a Macintosh screen with a program called *Professional Composer* that laid the foundation of a musical piece. The program counted out and automatically numbered the measures, creating a musical sketch to place notes. Leunberger could then move directly to his keyboard, the output of which fed into the Mac, again through a MIDI port. Once the rough draft was in the machine’s memory, it could be played back and manipulated. Leunberger used a digital sequencer with eight MIDI ports to assign the different voices to eight separate synthesizers. If he added a drum part, the MIDI clock synchronized the beat to the tempo of the piece. When the fine tuning was complete, the MIDI data went to a Yamaha digital sequencer, which controlled the playback of the completed piece through the eight synthesizers. Leunberger could still change the piece at any point or play along in real time.

Woods noted that synthesizers began to appear in the 1960s and found a special niche in the musical world over the next decade. Now with the advent of MIDI, electronic music could finally take center stage.

The Atari ST as a “Tapeless” Recording Studio

Chris French and Bob Moore joined Cheifet and Kildall for the first of three round table segments. French was a music software consultant with Activision. Moore was president and founder of Hybrid Arts, Inc.

Kildall opened by excitedly introducing *The Music Studio*, a $70 MIDI software package published by Activision for the Atari 520ST. (Nice to see Gary wasn’t holding a grudge over that whole Activenture name dispute.) He asked French for a demonstration.

Music Studio basically allowed users to compose and playback music. French explained that most operations could be performed just using a mouse. The software also provided “real-time” feedback, playing the accompanying note as the user moved the cursor around the on-screen musical staff. There were 15 available instrument slots, each using a different color for their respective musical notes.

French then played one of his own compositions called “Nvision,” which included sounds that he made using the software. This playback relied entirely on the Atari’s built-in sound chip. Cheifet then asked French to demonstrate a song using separate instruments attached to the ST’s built-in MIDI port. For this demo, French used a Casio CZ-101 keyboard, a Yamaha TX-7 tone generator, a Latin percussion drum machine, and a regular trap set drum machine. With all of this equipment, French played back his own MIDI version of “Axel F,” the theme from the 1985 movie *Beverly Hills Cop*. Cheifet asked French how long it took him to put the song together in *Music Studio*. French said it took about three-and-a-half hours.

Cheifet turned to Moore and asked him about Hybrid Arts’ products. Moore said his company manufactured a series of products for the 8-bit and 16-bit Atari computers. One of those products was ADAP, which he described as a “tapeless recording studio” or digital audio workstation.

Cheifet, Kildall, and Moore then went to a separate setup to the side of the studio for his demonstration. Kildall noted that Hybrid Arts made products for both consumers and music professionals. First, Moore demonstrated a consumer product called *EZ-Track*, which retailed for $65. The software allowed the user to send commands from an Atari 520ST to an attached Casio keyboard. For example, the program could change the tempo, start and stop drum machines, and make voice changes. Basically, this was a recording studio that let you manage different tracks. Moore showed how you could even correct the timing on a single track.

Cheifet next asked about ADAP, which was a high-end product offered by Hybrid Arts. Moore said ADAP was a 16-bit recording system that replaced tape machines. He demonstrated a version of ADAP on the ST that was CD-compatible. Kildall asked what an equivalent professional system would cost. Moore said some of his competitors were planning to release systems like ADAP over the next five years, which would likely cost around $300,000. The ADAP system ran between $2,000 and $15,000 depending on the configuration.

Cheifet wanted to know more about the CD compatibility. Moore said a CD player could be used as an additional sound source. It was patched into the stereo inputs of the recording system. ADAP could digitize analog inputs and store them in RAM, so it could then be played back and manipulated by the software. Kildall commented this was essentially a “word processor” for music. Moore agreed.

Amiga and Apple’s MIDI Offerings

Chris Potter joined Cheifet and Kildall in the side-studio for the first part of the next segment. Potter was the chief beta tester for Mimetics Corporation. There was also a Yamaha DX-100 hooked up to a Commodore Amiga. Potter was there to demonstrate his company’s product, *Soundscape*, using this equipment.

Potter said *Soundscape* offered a “music operating environment” that allowed the user to play up to 16 external synthesizers as well as use internal sampled sounds. He played a demonstration piece that included an organ. He then replaced the organ with the sound of tapping a wine glass that he sampled on-set.

Potter noted the Amiga was particularly well-suited for this type of music creation because it had four digital-analog converters, so it could playback sounds well. Additionally, he said the Amiga could run graphics in the background while playing music.

Kildall asked how the quality of a sample created with *Soundscape* compared with the audio quality of, say, CD audio. Was it a better quality sample? Potter said no, the sampled audio was lower quality but still perfectly adequate for a home studio.

Cheifet asked about the cost of *Soundscape*. Potter said it cost $149 for the software. The sampler hardware was an additional $99. Cheifet said this could then be used by both home users and professional musicians. Potter said yes, and in fact *Soundscape* was already being used by several professionals.

Moving back to the main desk, Cheifet and Kildall next spoke with Curtis Sasaki, the product manager for the Apple IIgs. Sasaki said the IIgs came with an Ensoniq sound chip, which was traditionally used in keyboards and allowed the IIgs to do both digitizing and synthesizing of music. He then played a digital sample retrieved from a CD.

Cheifet asked about the storage capacity for sounds on the IIgs. Sasaki said it was limited only by the amount of system memory. The IIgs could be configured with up to 8 MB of RAM. For reference, the sample he played was about 20 seconds in length and took up 600 KB of memory. Cheifet clarified that Sasaki wasn't demonstrating a particular software package, he was simply showing a sample program for the IIgs.

Cheifet next asked about the synthesizer capabilities of the IIgs. Sasaki loaded a copy of *Music Construction Set*, the Will Harvey program demonstrated in the first *Chronicles* episode dealing with computer music. Sasaki said Harvey had "quite a bit of fun" updating *Construction Set* to take advantage of the IIgs and the Ensoniq chip. Sasaki then played a sample song that was written with that program.

Cheifet asked how the IIgs version of *Music Construction Set* differed from that of the original Apple IIe program. Sasaki said the Apple IIe version only allowed the user to play four voices, while the IIgs could play 15 voices at once. Kildall asked how the IIgs sound processing compared with the Atari and Amiga 16-bit machines. Sasaki avoided making any direct comparison but reiterated the IIgs had the processing power to handle 15-voice playback.

Using Lisp to Analyze and Reproduce Music

Wendy Woods presented her second remote segment from the Stanford Center for Computer Research in Music and Acoustics (CCRMA), which was also profiled in the first-season computer music episode. Woods said that CCRMA researchers were now trying to imitate the human ear with a computer program. Specifically, the computer must not only hear the music but distinguish between several notes or harmonics played at once.

Woods said the CCRMA experiment involved a piano solo recorded through a microphone onto tape. The researchers wanted to see if the computer could play back the performance with the identical pitch, rhythm, and harmonics. This required artificial intelligence using the Lisp programming language. Chris Chafe of CCRMA told Woods that the research entailed finding algorithms that imitated how the human ear understood musical signals. Using Lisp they had a good tool bench for this kind of experiment. Woods added the tool bench also included a minicomputer, a signal processor, and a synthesizer. Another part of the software then wrote a score of the music and printed it out.

The entire process of analyzing a single, 30-second piece of music took an entire afternoon, Woods said. But as faster, more-powerful microprocessors hit the market this process could eventually occur in real time.

High-End Digital Editing Equipment for Audiophiles

David Schwartz and George Morrow joined Cheifet and Kildall for the final segment. Schwartz was president of Compusonics. Our old friend Morrow was identified in his new role as vice president of engineering with Intelligent Access.

Kildall asked Schwartz to demonstrate his company’s product, the CompuSonics DSP-1000. Schwartz said the DSP-1000 was the world’s first optical disc audio recorder. Unlike tape recorders, this machine recorded music onto optical discs. Kildall clarified that the DSP-1000 did not use the traditional audio CDs, which were read-only, but relied on recordable media that offered CD-quality audio. Schwartz added the media wasn’t just recordable, but recordable in a permanent way. He claimed the optical media wouldn’t wear out like a magnetic tape.

Cheifet noted you could also manipulate the audio data after it was recorded. He asked Schwartz for a demonstration. Using editing software running on an IBM PC (and soon on the Macintosh), Schwartz said a user could list tracks on an optical disc and process the data. For example, you could boost the bass levels, reduce background noise, or remove the effects of a “scratch” on the original record. Schwartz then played the exact same “Axel F” theme that Chris French demonstrated earlier in the program. Schwartz said he used the DSP-1000 to record that audio from the *Chronicles* control room.

Cheifet turned to Morrow, whom he noted was a major collector of 78 records with lots of scratches on them. What could he do with this type of setup? Morrow said he could probably take “the worst of the noise” out of his records. He could restore many of his historic recordings to make them sound more like they did when they were new. Additional analysis could even make it possible to restore how they sounded when they were recorded. Morrow said this was “one of the most exciting things” you could imagine.

Cheifet jovially asked who the market was for the DSP-1000 aside from “weird guys” like Morrow. Schwartz said the product was targeted at audiophiles at the high end of the market who were extremely serious about their music and could afford a $7,000 recording device. (Morrow said he couldn’t afford that.) Kildall asked about the price of the individual optical recording media. Schwartz said they cost $100 each and could store about 80 minutes of stereo on one side. There were also more expensive discs that could store 80 minutes on each side.

Cheifet asked Schwartz if he ever saw the price coming down on this sort of equipment to the point where it became a consumer item. Schwartz said as devices like this became more popular, he saw the price coming down by an order of magnitude, eventually to around $700. (Morrow liked the sound of that.)

Send Images via Electronic Mail for Just $99!

Susan Chase presented this week’s “Random Access,” which was recorded in September 1986.

- Commodore planned to cut the price of an Amiga 1000 system, with a color monitor and 256 KB of RAM, by between $500 and $1,490.

Commodore would also offer no-interest financing on Amiga purchases through 1987.

- Lotus announced plans to combine analysis software with financial information on CD, making it the first software company to enter the emerging CD-ROM market. *Lotus One Source* would come with eight databases containing 20 years of stock price information, with updated discs offered weekly. Chase said Lotus planned to sell the service to banks, investment firms, and large corporations.
- Intel was expected to announce a deal with IBM to make semi-customized computer chips. The agreement was expected to allow Intel to use some proprietary IBM technology.
- San Jose State University planned to offer a four-hour class on how to build your own IBM PC-XT compatible computer for less than $800. The National Association of Accountants in Florida planned to offer a similar class.
- Paul Schindler reviewed *Color Magic* (Lifetree Software, $40), a color palette selector for EGA display adapters.
- The IRS continued its automation program. Businesses from around the country, and individuals in seven sample cities, could file their 1986 income tax returns electronically. Chase said for the first time, filers could also receive their tax refund by an electronic funds transfer.
- Telegraphics announced a $99 program called *TeleVision* that allowed users to transmit computer graphics through commercial electronic mail services. But the recipient also needed a copy of the program to “decode” the images.
- One-third of workers in the United States reportedly experience some form of “uneasiness” when they work at a computer, and about 1 out of 20 suffered “severe” reactions.

Moore Led the Way in Atari’s Early MIDI Success

Although this episode basically covered all of the major personal computing platforms of 1986, it was probably the Atari brand that was most associated with MIDI music in this period. This association began more than a year before Jack Tramiel formed his Atari Corporation. MIDI itself had been in development since 1981, and the standard was first demonstrated at the January 1983 National Association of Music Manufacturers (NAMM) meeting.

Jim Pierson-Perry explained in a 1988 MIDI retrospective for *STart* magazine that Bob Moore was among the first people to realize that MIDI, which was originally developed for synthesizers, could be extended to computers as well:

> In April 1983 a small Los Angeles company named Hybrid Arts was formed that set out to bring MIDI to the Atari 8-bit computer line. Founder Bob Moore stated that they chose the Atari because it was the sturdiest of the lightweight personal computers and stood the best chance of surviving a professional road tour. Any questions about basing their work on a "game machine" were quickly quashed when Hybrid Arts demonstrated the very first MIDI sequencer program at the January 1984 NAMM show.
>
> This led to the MIDItrack II sequencer program for 48K Atari computers in mid-1984, followed by the even more powerful MIDItrack III for the 130XE in 1985. Both were extremely well received. A series of patch editors, librarians and a sample editor for the Mirage filled out the product line, which continues to do well today.

Pierson-Perry added that once the 520ST came onto the market, a number of other companies quickly joined the MIDI fray. He cited Activision's *The Music Studio* as a "surprise hit" in the field due to "its ability to change the sounds of the internal speaker voices, very much like using a software synthesizer."

Indeed, the 520ST would become popular not just with home musicians but professionals as well. Frank Foster, a former college classmate of Bob Moore who joined him in founding Hybrid Arts, recalled a meeting with Genesis co-founder and "Sledgehammer" Peter Gabriel for a 1987 Atari user group newsletter:

> It was two days after the Grammys… Peter Gabriel was meeting with me to discuss an ST MIDI system for his new studio. I wondered why someone like Peter Gabriel would be thinking about an ST when he already owned a Fairlight and could probably afford any computer system he wanted. He listened quietly, taping our conversation with a small portable recorder. I explained that the ST was the continuation of the revolution that MIDI started. This technology–previously out of reach, financially, to the average musician–would now be accessible to even the "potential musicians," people who, with the aid of a computer, might find new musical abilities they had never been aware of.
>
> He smiled, and I realized it was probably the politics of MIDI, this new affordable access to technology, which attracted his attention to the ST. That, plus the freedom these recent advances now offer to the artist…
>
> "Whether it's an album or video project, I like to work from as many options as possible," he said. After the meeting was over, I watched him walk toward the parking lot with an armload of ST software, and I couldn't help but think the Atari ST had finally made it.

Foster left Hybrid Arts in 1987 to join Atari Corporation where he served as director of special markets for two years. It's not clear to me how long Moore was actively involved with Hybrid Arts. In 1992, Digital F/X purchased Hybrid Arts' hardware technology, including the ADAP system that Moore discussed on the broadcast. Moore later said that the ADAP was used by a number of television programs for their sound editing, including *The Simpsons* and *King of the Hill*. Meanwhile, three former Hybrid Arts employees started a new company in 1992, Barefoot Software, and acquired the rights to keep supporting Hybrid's legacy software products. Based on California corporation records, Barefoot only stayed in business for a couple of years.

Schwartz Helped Pioneer MP3 Standard

David Schwartz was an architect by training, earning his degree from Carnegie Mellon in 1972. But he was also a musician with an interest in figuring out how to compress and store digital audio on floppy disks. In 1984, Schwartz filed for and received a United States patent for an early audio compression technology that he claimed would make it possible to store 45 minutes of digital audio–in stereo–on a single 5.25-inch floppy disk.

It was an outlandish promise and it managed to attract a modest amount of capital. Barry Fox, writing for *Stereo Sound* in October 1986, said a Colorado-based investment bank helped Schwartz launch Compusonics–originally named CompuSound–in 1981 with $100,000 in funding. Even before producing a working product, the company went public in 1983 and raised an additional $650,000. Schwartz announced the DSP-1000 at a May 1984 press conference in New York City with the proclamation, “The age of true digital audio began today.” At the summer Consumer Electronics Show a month later, Compusonics showed off the first prototype of the DSP-1000.

For the next two years, Fox reported, Compusonics “had stands at several shows” touting the potential of the DSP-1000, but “the system was always not quite ready for demonstration that day.” The problem was Compusonics couldn’t actually manufacture 5.25-inch disks that could store 45 minutes of digital audio. It was not until 1986 that Compusonics managed to produce a working prototype with a disk that held just 4 minutes of stereo audio. Even then, Fox said the “sound was very poor and the music skipped and stopped for up to half a minute.” This is presumably when Compusonics shifted hears to the floppy-sized optical discs that Moore demonstrated on *Chronicles*.

By this point, the company was bleeding money. In October 1985, Compusonics reported a $2.3 million quarterly loss. The company decided its best chance for turning things around was to produce a professional line of digital recorders and editors, which were dubbed the DSP-2000 series. According to George Peterson, writing in 2009 for *MIX*, Schwartz said Compusonics “did well in pro audio” and the DSP-2000 eventually found its way into a number of post-production houses.

Compusonics apparently did well enough in the professional market to stay in business until 1990. Peterson said that Schwartz went on to head a software group at Tandy that helped to develop the MP3 audio standard, which was effectively the culmination of Schwartz's early work at Compusonics in digital audio compression. Schwartz also had a stint at Jack Tramiel's Atari Corporation where he worked on the Atari Falcon home computer and the Atari Jaguar game console. In the mid-2000s, Schwartz returned to his roots in architecture, serving as a lead architect for Madsen, Kneppers & Associates. Since 2013, he's worked as an engineering and design consultant in northern California.

Notes from the Random Access File

- This episode is available at the Internet Archive and has an original broadcast date of September 30, 1986.
- Stewart Cheifet presented his cold open from the San Francisco Opera House where music from a 44-rank organ could be heard. But Cheifet noted the "organ" was actually an Apple IIe with an attached MIDI hardware-software package called the *Cathedral 100*.
- Bob Moore ended up working in television for a time. He received an Emmy nomination in 1997 as part of the sound editing team that worked on the medical drama *Chicago Hope*.
- Curtis Sasaki left Apple shortly after this program aired to join Steve Jobs' NeXT Computer. Sasaki remained with NeXT as a product manager until 1992. He later had an extended stint at Sun Microsystems as a vice president, and in the 2010s and early 2020s worked in a variety of posts with Samsung Electronics.
- Chris Chafe joined Stanford University's CCRMA in 1978 and has served as its director since 1995.
- As I discussed in my recent special post on George Morrow, he did in fact spend the latter part of his life digitally remastering and re-releasing old 78 albums from his extensive collection through his own record label, The Old Masters.
- Bob Moore's Hybrid Arts, Inc., didn't just pioneer the use of MIDI as a digital music standard. In 1987, the company published *MIDI-Maze*, believed to be the first non-musical MIDI software product. *MIDI-*

Maze was an early multiplayer, first-person shooter game that used the Atari ST's built-in MIDI port to link together multiple machines.

- Scott W. Gibbs founded Mimetics Corporation in 1984. Gibbs was previously a co-founder at Syntauri Corporation whose president, Ellen Lapham, was a featured guest on the 1984 *Chronicles* music episode. Mimetics was only in business for a few years and I didn't learn much about the company and its ultimate fate. As for *Soundscape*, Ben and Jean Means wrote a largely favorable review of of the package for the July 1987 issue of *Amiga World*. The reviewers pointed to the software's ability to demonstrate audio and video simultaneously on the Amiga. But the Means also noted that earlier releases of *Soundscape* were buggy and prone to crashing.
- The Apple IIgs version of *Music Construction Set* demonstrated by Curtis Sasaki was not the same product as *Deluxe Music Construction Set*, which Electronic Arts also released in 1986. *Deluxe* was essentially a new program written by Geoff Brown. Will Harvey, who created the original *Music Construction Set*, separately ported that program to the IIgs. That is what Sasaki demonstrated. But just to make things more confusing, there was also an unreleased IIgs port of *Deluxe* written by EA's Randel Reiss.
- *The Music Studio* was published by Activision but designed by another company, Audio Light, Inc. I assume this was simply an attempt by Activision to compete with the more popular *Construction Set* offerings from rival EA.
- We'll hear more about *Lotus One Source* in an episode from later in this season of *Computer Chronicles*.
- The theme from the television program "St. Elsewhere" composed by David Grusin was apparently a popular way to demonstrate MIDI capabilities in 1986. Gary Leunberger played the theme during Wendy Woods' remote segment, and Curtis Sasaki used it in his IIgs demo of *Music Construction Set*. (Does this mean *Computer Chronicles* is part of the Tommy Westphall Universe?)

Chapter 4: The IBM RT PC

During the run of *Computer Chronicles* thus far, IBM launched a number of products that failed to dominate their respective markets, including the PCjr, *TopView*, and token ring. But that didn't stop Big Blue from trying to recapture its early PC glory days. This next *Chronicles* episode from October 1986 demonstrated yet another stumble in the form of the IBM RT PC, which despite the name was not part of its personal computer line, but rather an experimental minicomputer/microcomputer hybrid based on an architectural approach known as RISC.

Unable to avoid the obvious dad joke, Stewart Cheifet opened the program by showing Gary Kildall a RISK game board. But the topic of course was RISC, which stood for "reduced instruction set computing." Cheifet noted that major players like IBM and Hewlett-Packard were now involved in RISC. And while some people were saying RISC was the "wave of the future," others said it was "already a passe technology."

What did Kildall think? Kildall noted the current IBM PC line–the PC, the XT, and the AT–were all based on the Intel 8086 microprocessor, which succeeded the earlier 8-bit 8080 CPU. This left the industry with a "messy architecture" that faced some barriers, such as expanding the amount of addressable memory space beyond 640 KB. RISC gave us a new starting point. By using a simpler instruction set that took up less code space, that could make it easier to write compilers and ultimately software programs.

H-P Bet on Speed Potential of RISC

Wendy Woods presented her first report, narrating some B-roll footage taken at a Hewlett-Packard laboratory. Woods said that in the search for faster and more powerful computers, improved hardware often took center stage while changes in architecture trailed behind. The new architectural design used in RISC relied on simpler instructions requiring fewer machine cycles.

Woods said in the early 1970s, IBM examined the kinds of operations most commonly carried out by a complex instruction set computer (CISC) and found that only about 20 percent of the simplest instructions represented 80 percent of the processing time. RISC architecture relied on those simple computational elements to execute most of its operations in a single cycle.

While RISC had made few inroads in the market thus far, Woods said, at least one major company–Hewlett-Packard–demonstrated its confidence in RISC by introducing a whole line of RISC-based machines as the next generation of its high-end computers. All computations except “load” and “store” took place in the data path. Inline subroutines could be called up for complex functions and assist processors operated when required for floating-point arithmetic and graphics.

Woods said the special nature of RISC design made it well-suited to engineering and scientific applications, where instructions of 4 bytes or less could be executed in one cycle. But while such applications demonstrated the advantages of RISC, some critics contended that the speed gained by reduced instructions could be wiped out by the longer data paths–and by the need to accommodate complex functions.

RISC Is a Philosophy, Not an Instruction Set

For the first of three round tables, Dr. Joel S. Birnbaum and Dr. David Patterson joined Cheifet and Kildall. Birnbaum was a vice president at Hewlett-Packard. Patterson was a computer science professor at the University of California, Berkeley, and the researcher credited with coining the term RISC.

Kildall asked Patterson for some background on the origins of RISC and what made it different from traditional machine architecture. Patterson said the idea was simplicity, of going back to a “small is beautiful” philosophy. There were several origins to RISC, including work done at IBM during the mid-1970s as well as other research groups in California. But the basic idea was to make computers faster and more cost-effective.

Kildall pressed for a more specific comparison in speed between, say, an IBM PC-AT with an Intel 80286 CPU and a RISC-based machine. Patterson said researchers in the field believed that using the same resources, you could get a 2- to 4-times improvement in cost-performance with RISC compared to a traditional design. So given the same transistors that Intel used on the 286, you could theoretically build a machine like the AT that was 2 or 4 times as fast.

Cheifet asked Birnbaum about the 80/20 ratio–the same one that Wendy Woods mentioned earlier–regarding the percentage of instructions most commonly used by a CPU. Birnbaum said the notion was that computers spent most of their time, roughly 80 percent, doing a few simple things and did not do complex things very often. So if you optimized the machine to do the simplest things as well as possible–and to do the complex things as infrequently as possible–you might come out with a machine that for certain types of jobs would be more effective.

Kildall asked if RISC was a philosophy of machine architecture or a specific set of instructions. Birnbaum said it was the former. RISC was a style that differed depending on what you were trying to do. The main idea was not to add any complexity to the machine unless it “pays for itself” by how frequently that complexity was used. For example, a machine used in a scientific environment that required the heavy use of floating-point calculations might make a different set of trade-offs than another machine where that wasn’t important.

Kildall asked Birnbaum where he saw RISC architecture as important to computing right now. Would it be a replacement for a desktop computer? Birnbaum reiterated there was no such thing as “RISC architecture.” There was good engineering design of a computer. All computers should be designed by analyzing exactly what they do and the objectives of the person building the machine, and then incorporating that analysis into the specific design. It’s turned out that a smaller number of instructions can, in fact, address a very wide range of applications and types of applications. That is the RISC philosophy. But there were other factors that went into a successful design. He noted that at Hewlett-Packard, his team spent about two-thirds of their time on issues that had nothing to do with the instruction set itself.

Kildall asked how users would be convinced to move to a new architecture like RISC given issues like software compatibility. Birnbaum acknowledged that H-P was trying to get its customers–as well as some other companies' customers–to move onto the new machines from at least three previous "families," each with their own instruction sets and compilers. So H-P had to provide a smooth migration path for these customers. For software written in a high-level language (like C), that could often be accomplished simply by recompiling the code, which retained most–but not all–of the features of the native-mode architecture. When people didn't have that capability, H-P offered a range of hardware and software tools that offered a "compatibility mode" to translate instructions from one architecture to another.

Cheifet turned to Patterson and asked him how he saw the evolution of RISC proceeding. Patterson said it was interesting how viable the RISC philosophy had turned out to be in many different fields. The original work was done on artificial intelligence and floating-point computations. Since then, several groups had done experiments that showed RISC designs could work well on various number-crunching applications.

Defining the Market for RISC

The second round table featured Dr. William Frank King, the general manager of IBM's advanced engineering systems group, and Hugh Martin, a vice president with Ridge Computers. Also on set was the sole product demonstrated in this episode, the IBM RT PC. (RT PC formally stood for "RISC Technology Personal Computer.")

Kildall opened by noting that the RISC philosophy focused on the design of the CPU. But what about related concepts like parallelism, I/O, and things like that? Martin said that at Ridge, they concentrated first on the CPU but the entire machine had to be designed to be efficient. So Ridge spent a lot of time initially on I/O (input/output) performance to match the CPU's performance. And now that they had a simplified processor, they could examine parallel architectures. Kildall noted that DEC minicomputers like the VAX 11/780 were popular because they were good I/O processors. Did Martin see RISC architecture as a competitor for the VAX on that front? Martin said you needed a fast I/O system regardless of the type of computer. But he found that Ridge's machines were performing as well as the VAX in terms of I/O.

Kildall turned to King and asked about the RT PC. Specifically, Kildall pointed out there was actually a co-processor in the RT that could handle standard 80286-based applications. King said the RT ran between 1.6 and 2.1 million instructions per second and the 286 co-processor board ran at about one-third of that speed.

Cheifet asked King what market the RT PC aimed at. Who was actually buying this RISC machine? King said the tabletop version of the machine–the one on the set–was packaged primarily for people who needed speed and capacity above what the IBM PC and similar systems could support. Cheifet pressed who those people were. King said engineers, architects, and people in the insurance industry. Cheifet suggested that meant IBM saw a market for business applications on the RT and not just scientific ones. King said yes, the RT was marketed at "high-end" business applications.

Kildall then asked the inevitable question: How much did the RT cost? King said the machine sitting on the table cost about $10,000 and came with up to 4 MB of RAM and a 70 MB hard drive.

Kildall then decided to demonstrate the RT–relying on the "10 to 15 seconds of instruction" he received from King–specifically the machine's graphical interface. (The RT PC came with AIX, IBM's proprietary version of UNIX, running the X window system.) Kildall pulled up a window containing a document with a "technical illustration." He then selected an object in that illustration and rotated it in real time. Cheifet noted this required a lot of processing power.

Cheifet again brought up the issue of adapting software to the newer RISC-based machines. Did you have to write new software to run on the RT? King said no, most of the software that ran on this machine was written in a high-level language. So you needed compilers that could work with RISC architecture, but the compiler effectively “masked” the current software.

Repeating his earlier question to H-P’s Birnbaum, Kildall asked King about IBM’s strategy for moving applications over to the RT PC. King reiterated that it started by defining a set of compilers. But the price-performance of the RT still had to justify people moving their software over to it.

Cheifet asked Martin about Ridge’s customer base, noting it was a much smaller company that had sold about 400 to 500 RISC computers. Who was Ridge selling those machines to? And what was their niche against giants like IBM and H-P? Martin said Ridge’s niche was price-performance in the technical marketplace. For example, one of Ridge’s customers was the computer graphics company Pacific Data Images-itself a subject of multiple prior *Chronicles* episodes–which had 12 Ridge computers doing its 3D rendering.

Cheifet asked King what was coming next. There were rumors of IBM releasing an “enhanced” RT PC. What changes could we expect? King said IBM never talked about future products. But invoking Moore’s law, he saw a doubling of speed and capacity in the desktop personal computer market continuing every 12 to 14 months. If IBM planned to continue participating in this market–which it did–then they needed to find a way to sustain that improvement.

Kildall pointed out that recent speed gains from the Intel 286 and now 386 CPUs already seemed competitive with RISC. For instance, a 386 running at 24 megahertz was pretty close to the RT PC. King said the 386 processors available today actually ran at 16 megahertz. But he admitted that as the Intel architecture became faster, the RT PC would have to stay faster to justify its price. And that was IBM’s goal.

Using RISC to Design New Computer Chips

Wendy Woods returned for her final report, this time from ESL in Sunnyvale, California. Woods said ESL was designing the world’s fastest systolic processor, a chip that could be used in everything from sophisticated listening devices to image processing of pictures from outer space.

ESL’s needs required tremendous computing power, Woods noted, for which the company’s engineers relied on a RISC-based minicomputer from Pyramid Technologies. Dr. Nickolas Dunckel of ESL told Woods the RISC computer enabled them to have a machine that ran much faster, which was very important because their programs took so long to run. The RISC machine was also very efficient in handling multiple users at the same time. He added that the particular instruction mix ESL got from its integrated circuit design–which relied on fixed-point rather than floating-point numbers–ran particularly fast on the RISC architecture.

Woods said that ESL was designing an integrated circuit with 62,000 transistors. The RISC computer was used to perform a thorough simulation and verification of that design before it was committed to silicon. Woods added, however, that even after two years of using the Pyramid machine, ESL was still not completely sold on RISC technology. Dunckel and his team believed that parallel processing offered similar advantages. But the bottom line was these types of engineering projects never had enough processing power and engineers were not married to any one technology when it came to getting their work done.

Could a “Watered-Down” RISC Approach Still Win?

Regular contributors Jan Lewis and George Morrow joined Cheifet and Kildall for the final segment. Kildall opened by noting the computer industry had been reluctant to accept new architectures in the past. Would this be a problem for the RISC architecture? Lewis said it would be a problem. Not only would there be reluctance to accept a new architecture, but Lewis said she was personally skeptical about RISC, particularly with respect to its viability in consumer applications. She added that H-P and IBM’s machines were effectively “watered-down” versions of RISC. They used some of the RISC principles but were not “true RISC machines.” And some of the performance improvements seen in these machines may not be due to RISC but because of other factors like having more on-chip registers.

Morrow said, “Looking at it from a point of view of silicon, the richer register sets and the simplified instruction sets favored the use of silicon,” which was a positive thing. On the negative side, he noted that we kept making new instruction sets, which was like inventing a new typeface every time you wanted to say something. What Morrow would really like to see is someone make a computer that could run anybody’s binary without recompiling or translations or any of this stuff.

Cheifet followed up on Lewis’ remark that the current RISC offerings from IBM and H-P were “watered down.” What was the technical problem that prohibited a more complete RISC implementation? Lewis said there were a few issues. The first was that RISC proposed sending one instruction–each containing multiple simple instructions–per CPU clock cycle. But in practice, a machine like the RT required a lot of extensions, which made the actual performance closer to one instruction per 2.7 clock cycles. So we’d evolved from “RISC in the pure sense” to “RISC-like architectures” to “architectures using RISC principles” to “simplified instruction sets with on-chip registers.”

Kildall asked about the first potential applications for RISC architecture. Lewis said it would largely be in the scientific community. Those applications didn’t require the same amount of I/O, which was still a problem. The engineering and scientific community was also less “standards conscious” and therefore more willing to accept a new architecture.

Cheifet noted that despite the problems discussed by Morrow and Lewis, Hewlett-Packard was reportedly “betting” its entire computer division on RISC technology. Morrow disagreed with that characterization. He noted that part of H-P’s investment was in transporting customers from their standard environments to something that was perhaps more flexible. And while he agreed with Lewis about the current drawbacks of RISC, he said better-written compilers would hopefully get us to the point where there were truly portable, high-level languages.

Kildall asked about the impact of other new CPUs coming onto the market such as the Intel 80386 and the Motorola 68030. Morrow noted the speed on the 68030 was especially impressive. So it was possible the traditional approach to computer architecture would continue to get better. Eventually, however, we'd get down to the point where "silicon is important," and on that front RISC beat CISC.

H-P Delayed Bet on RISC Machines

Stewart Cheifet presented this episode's "Random Access," which was recorded in October 1986.

- Hewlett-Packard said "software problems" would delay the planned shipment of its RISC-based Spectrum minicomputer until mid-1987.
- IBM announced "upgrades and improvements" to the RT PC. The new RT Model 15 would feature improved networking capability, memory, and storage. Cheifet added that IBM was also cutting the price of the RT.
- IBM transferred 2,000 employees into sales as part of a planned increase of its sales force by 5,000 people.
- Apple reached a deal with Northern Telecom to enable the Macintosh to network over regular telephone lines. Cheifet said this would increase the Mac's networking speed by a factor of 18.
- Lotus Development Corporation debuted its new AI-based *Hal* add-on for *Lotus 1-2-3* at the Info '86 show in New York.
- At the recent Software Publishers Association conference in Washington, DC, a spokesman for Educational Systems Technology predicted that computers would "reverse the trend" of smaller classroom sizes. Cheifet said the prediction was that teachers could handle classes of up to 90 students using computer assistance.
- Paul Schindler reviewed *Tornado Notes* (Micro Logic, $50), a note-taking and management program.
- Gammalink announced a new $1,000 add-on board that lets a user send copy from a PC directly to a fax machine.
- Federal Express eliminated its own fax service, *Zapmail,* due to heavy losses.

- The Overseas Security Advisory Council started a BBS on international terrorism to provide information for American businessmen traveling abroad.
- A "blind businessman" in Indiana developed *Rapsheet*, a talking spreadsheet that he planned to give away for free to blind users.
- Researchers at Carnegie Mellon University said they were "making progress" on synthesizing protein molecules that could one day be used to create "molecular computers."

Corporate Politics Likely Doomed the RT PC

As I alluded to in my introduction, the IBM RT PC was not a great success. While it wasn't a complete disaster like the PCjr, the RT series sputtered along for roughly four years before IBM moved on to a new line of RISC-based machines, the RS/6000, in 1990. And by that point, a number of other companies had successfully entered the nascent RISC market.

So what went wrong? Authors Charles H. Ferguson and Charles R. Morris documented the troubled history of the RT PC in their 1993 book, *Computer Wars: How the West Can Win in a Post-IBM World*, which offered a detailed account of IBM's decline in the late 1980s based on numerous interviews with company insiders. What follows is largely summarized from their work.

As David Patterson noted during the broadcast, IBM began work on what he would later describe as RISC during the 1970s. More precisely, Ferguson and Morris credited IBM's early RISC work to John Cocke of IBM's Yorktown Heights (New York) Research Center. IBM kept Cocke's work secret for most of the 1970s. At the same time, Patterson conducted his own research into RISC concepts at Berkeley–aided by some graduate students who previously interned at IBM–while Dr. John Hennessy led a similar effort at Stanford University. Hennessy later co-founded MIPS Computer Systems, while Hennessy's work led to the development of the Sun Microsystems SPARCsystem. MIPS and Sun would effectively dominate the early RISC-based CPU market in the United States. (Patterson and Hennessy later shared the 2017 A.M. Turing Award from the Association for Computing Machinery for their work in developing RISC.)

As for IBM, it may have been the first to research RISC ideas, but company politics stymied Cocke’s initial attempts to actually bring a product to market. Indeed, Ferguson and Harris said Cocke developed an early prototype called ACS in 1968 that “incorporated early versions of the key RISC concepts.” Management quickly killed ACS, however, because it was incompatible with its System/360 mainframe line, which was IBM’s main product line at the time.

Sometime around 1974 or 1975, Cocke developed his next idea, the ServiceFree, which he claimed was 50 times faster than IBM’s existing mainframe line, which by then was the System/370. But again, Ferguson and Harris said IBM killed Cocke’s project so it could dedicate more resources to another (ultimately doomed) project called F/S.

Another guest from the episode, Joel Birnbaum, was Cocke’s supervisor during this time. In 1976, Birnbaum gave Cocke the go-ahead to start work on yet another CPU prototype, which was eventually named the IBM 801 after the number of the building where it was developed. Ferguson and Harris noted the creation of the 801 was “usually designated as the invention of RISC.”

But the IBM 801 was not yet ready for the market. IBM’s mainframe division continued to oppose the very idea of RISC processors. Despite this, the company’s Austin division, where W. Frank King was the general manager, decided to take up the 801’s development. Using the 801 design the Austin team produced the Research/Office Products MicroProcessor (ROMP) in 1980. Ferguson and Harris noted this took place at least a year before Patterson designed his first RISC processor at Berkeley.

There was at least one senior IBM executive, Bob Evans, who supported the idea of creating a new company-wide architecture based around the ROMP. Ferguson and Harris said that even at the height of the IBM PC’s success, Evans was concerned about the “potential danger from clones if Microsoft and Intel controlled the PC architecture.” Cocke’s team managed to develop a prototype compiler–the Austin Compiler System–which made it theoretically possible to run the same code on either the ROMP or the existing System/370 mainframes. But there was a caveat: The Austin compiler required at least 10 MB of RAM, which was too much for the

Series/370 to spare, as the mainframe's design limited it to a maximum of 16 MB of RAM. "[A]lthough RISC's potential was beyond dispute," Ferguson and Harris said, "no one was prepared to tell the mainframe division to fix the 370's memory or move on to a better architecture."

By the end of 1983, IBM's senior management abandoned the idea of a company-wide RISC standard. But they still approved two RISC-related projects. The minicomputer division would handle one project, dubbed "Fort Knox," while Austin would start work on a ROMP-based workstation. Although called "Olympiad" at this point, the latter project would eventually become the IBM RT PC. (Ferguson and Harris said Evans was dissatisfied with this "compromise" and left the company.)

This was not the end of corporate politics, Ferguson and Harris noted. There were several key decisions that ended up seriously crippling the RT. First, IBM decided to manufacture the ROMP CPUs themselves at its Burlington, Vermont, factory. Up to this point, Burlington primarily focused on memory chips and in fact had no prior experience making microprocessors. Ferguson and Harris said the CPU that Burlington finally produced was "deficient," but management never considered outsourcing the production to an established manufacturer like Intel or Motorola.

Second, although the shipped RT PC ran a UNIX-like operating system, it wasn't exactly UNIX. At the time, UNIX was owned by AT&T, which IBM still viewed as a potential competitor in the computer market. Accordingly, Ferguson and Harris said IBM management decreed that its new ROMP machine "would have a custom IBM software layer, called the Virtual Resource Manager, standing between the ROMP and UNIX." This way, IBM could "expand" the virtual layer into a proprietary operating system later if AT&T tried to assert too much control. Unfortunately, this virtual layer also slowed the RT's performance "badly" and delayed the project's development by another year.

Finally, there was another IBM division that had convinced management to adopt a company-wide graphics standard. As you might expect, this new standard was largely dictated by the demands of the mainframe division. This added to the RT's delays. On top of that, the people in charge of the RT had something of an identity crisis. Frank King's Austin division largely focused on office products like typewriters and standalone word processors. This led to repeated flip-flopping over whether to position the RT PC as an office machine or a workstation targeting the scientific and engineering communities. (King's response to Stewart Cheifet's questioning suggests this issue was never quite resolved.)

When IBM finally released the RT PC in April 1986, the public response was underwhelming. IBM's competitors certainly weren't running scared. Compaq President Rod Canion told Wendy Woods' *Newsbytes* that the RT PC would fail because it wasn't "fully compatible" with the existing IBM PC line and that compatibility had "taken on a life of its own, independent of IBM." Robert Wight, an executive with Maynard Electronics, a major developer of IBM add-ons, told *InfoWorld* that his company didn't "consider the RT a major machine." Other add-on manufacturers were similarly unimpressed, although several did eventually produce peripherals for the RT.

As Stewart Cheifet reported during "Random Access," by late September 1986 IBM was already rushing to put out a new version of the RT. The Model 15 was priced lower than the original RT–but it still cost $10,050. At the same time, IBM cut the price of its original RT models between 20 and 32 percent. IBM continued to update the line through the end of 1989, but as Ferguson and Harris concluded, the entire RT project "was an embarrassment–years late, with capabilities weirdly mismatched to its proclaimed market, very expensive, and most damningly, slow." They added that IBM's upper management was "shocked" when Sun Microsystems' SPARCstation, released in late 1986 and based on Patterson's work at Berkeley, "decisively outperformed the RT PC, often by several factors, on every count."

Notes from the Random Access File

- This episode is available at the Internet Archive and has an original broadcast date of October 2, 1986.
- Dr. Joel S. Birnbaum spent 15 years at IBM where, as previously noted, he oversaw the company's early RISC research. He joined Hewlett-Packard in 1980 as a vice president, where he also served two

stints as director of H-P Labs. Birnbaum remained with H-P until his retirement in 1999. In retirement, he also served a number of years on the board of trustees for the SETI Institute.

- Dr. David Patterson spent nearly 40 years as a computer science professor at Berkeley, retiring in 2016. Patterson is currently a Distinguished Engineer with Google Research and vice chair of the board of directors at RISC-V International, a Switzerland-based nonprofit that promotes a newer, open RISC standard.
- Dr. William Frank King left IBM in the late 1980s to join Lotus Development Corporation, where he was a senior vice president. In 1992, King became president and chief executive officer of PSW Technologies, Inc. PSW, which later renamed itself Concero Inc., originally provided software services to large vendors. Indeed, IBM was PSW's biggest client in the mid-1990s, accounting for 52 percent of sales. As Concero, the company pivoted in the late 1990s to "e-business solutions" for Internet and interactive television companies. King left the CEO's role in 1998 but remained on the board until the company's dissolution in 2003. He's been a private investor since then and served on a number of corporate boards, including the intellectual property investment firm Inventergy, Inc.
- I didn't learn much about Ridge Computers except that it dissolved in April 1990. Hugh Martin left Ridge in 1988 to join Apple for three years. In 1991, he became president of the 3DO Company, Electronic Arts founder Trip Hawkins' attempt to create a new video game hardware and software manufacturer. When 3DO sold off its hardware business to Samsung in 1997, Martin left the company. He's served as CEO of a number of tech ventures since then, most recently Lacuna Technologies, a developer of mobility software for cities.
- Hewlett-Packard's Spectrum program later became known as its Precision Architecture or PA-RISC series, which remained in production in various forms until 2008.
- Bill Grimm was the developer of *Rapsheet*. According to a September 1986 Associated Press report, Grimm lost his sight due to a motorcycle accident in 1974. He started Computer Aids Corporation to develop a number of software programs targeting blind users, including "Small Talk, a five-pound, talking computer that fits in a briefcase."

- As I mentioned in the recap, the IBM RT PC demo featured the X Window System. The X Window System–also known as X11–continues to be used today in many UNIX-based operating systems, including the Fedora laptop that I use to write this blog. (No, I haven't switched to Wayland!)
- The most notable omission from this episode was any mention of Acorn Computers Ltd., a United Kingdom company that introduced its own RISC-based microprocessor in 1985. Originally known as the Acorn RISC Machine (or ARM), Acorn's work would eventually set a key standard for RISC-based architecture throughout the tech industry, including most of the smartphones in use today and the recent line of Apple Silicon Macs.

Chapter 5: Disk Optimizer, DoubleDOS, XTree, HOT, Above Disc, dBase Programmers’ Utilities, and Detente

Business applications and games may garner the most attention when talking about computer software from the 1980s, but for many companies the real key to success was in utility programs. Keep in mind, this was a time when operating systems like MS-DOS and CP/M still came on floppy disks. This meant there wasn’t much room for extra features, even utilities that we would now consider basic features of a modern operating system.

This next *Computer Chronicles* episode from October 1986 was all about the utilities. Stewart Cheifet and Gary Kildall opened the program with a computer from fourth-season sponsor Leading Edge hooked up to a printer spitting out a *Lotus 1-2-3* spreadsheet. Cheifet explained they were using a utility called *Sideways*, which enabled the printer to output the spreadsheet horizontally rather than vertically, something that *1-2-3* could not do it on its own. Cheifet noted that utilities like *Sideways* worked with application programs, while other utilities worked with operating systems.

As someone who designed operating systems, did it bother Kildall when someone designed a utility for something he never thought of in the first place? Kildall said not really, because when you designed an operating system, it was really hard to tell what features people wanted, especially when you were trying to keep the memory requirements really small. With respect to CP/M, he said, one of the first utilities that came out was an “undelete” program.

Making Macs Work Better

Wendy Woods narrated her first remote report over some B-roll footage taken at a print shop in Palo Alto, California. She said that for most computer users, utilities were convenient accessories that performed mundane housekeeping chores like copying a disk or telling the time. But as files grew and applications became more complex, utilities took on new importance.

This particular shop provided an elaborate array of electronic publishing services, Woods said, from typesetting to graphic design. The Macintosh-based shop relied on a group of specialized utilities to organize and manipulate their customer files. For example, a utility called *TOPS* made it possible to transfer IBM text files over an AppleTalk network to a Macintosh, where the files could be reformatted using another utility. To change the size of graphics while retaining the same proportions, the shop's staff used an electronic proportion "wheel" utility. And to support electronic publishing's PostScript language, a template utility was also necessary.

Woods said that like many computer users with hard disks, people at this shop faced the aggravation of mislabeled or misplaced files. A utility called *Locator* could recover them using just a single keystroke and trace the file's directory and subdirectory. So in spite of their un-glamorous reputation as program accessories, utility packages had grown in popularity and functionality–at least occasionally crossing the barrier from desktop organizers to mainstream software.

You Can Run Two DOS Programs at Once (Sort Of)

Ed Tolson and Dale Sinor joined Cheifet and Kildall in the studio. Tolson was president of New Hampshire-based SoftLogic Solutions, Inc. Dale Sinor was a co-owner of Executive Systems, Inc.

Kildall noted that both guests had made a business out of selling utilities. How big a business was it? Tollson said it was a "pretty big" business. There were a lot of holes in the operating system for utilities to fill up. Kildall asked Sinor how many customers he had for his product, *XTree*. Sinor replied they'd sold over 100,000 copies.

Kildall asked Tolson for a demonstration of his company's products, *Disk Optimizer 2.0* and *DoubleDOS*. Tolson said *Disk Optimizer* was meant to keep a hard disk working as fast as possible. The problem it cured was file fragmentation. Cheifet asked Tolson to explain what that was. Tolson said that DOS stored files in individual packets called clusters. On the demonstration system each cluster was 2 KB. So if you had a 100 KB file or program, it could literally be stored in 50 different places on the disk. What *Disk Optimizer* did was make all of those pieces continuous, so the drive didn't have to move around to seek each piece and therefore could load the data faster.

Tolson ran an analyzer program within *Disk Optimizer*, which displayed on-screen the optimization for each of the files. If a file was 100 percent optimized, that meant all of its pieces were contiguous. The analyzer program displayed the names of 100-percent optimized files in green. The names of badly fragmented files were displayed in red. (Borderline file names were displayed in yellow.) Cheifet asked what the "zero percent" meant next to the red files. Tolson said that meant none of the file's clusters were contiguous.

Cheifet asked how you would make all of the files 100 percent optimized. Tolson didn't have time to actually demonstrate this, but he explained that you would run the optimizer program on the disk drive. The program then went through everything on the drive and reorganized the information. Tolson added this was done in a safe fashion to protect the data.

Kildall then asked Tolson about his other product, *DoubleDOS*. Tolson explained that *DoubleDOS* was a two-task multitasking system providing classic foreground-background operation within MS-DOS. Basically, you could start up one program such as *Lotus 1-2-3* and then run *WordStar* while keeping *1-2-3* in the background. Cheifet observed this meant you could print out something from one program while working on the other program. Kildall asked if this created any problem with file conflicts. Tolson said no, as long as you didn't try to edit the same file with both programs at the same time.

Cheifet then turned to Sinor and asked for demonstrations of his company's utilities, *XTree* and *HOT*. Sinor said that *XTree* was a file and directory management program for DOS. He thought that utilities should do two things: make the computer easier to use and save time. *XTree* was a big time saver because it showed you clearly what your directory structure looked like and made it easy to move, copy, or delete files.

Sinor then showed a sample screen from *XTree*. The program divided the screen into several windows. The top window showed the directories and subdirectories on the disk in a tree format. The bottom window displayed the individual files within the currently selected directory. Sinor said you could also show all files in all directories and sort files alphabetically, by extension, by size, or date and time. Kildall asked how long *XTree* had been on the market. Sinor said about 18 months. Cheifet asked about the cost. Sinor said it retailed for $49.95.

Cheifet next asked about *HOT*, another utility from Executive Systems. Sinor ran into a bit of trouble getting the demo running. He was using the same machine that Tolson used a few minutes earlier for the *DoubleDOS* demo, and *DoubleDOS* failed to allocate enough memory to run *HOT*. While Tolson fixed that problem, Sinor explained that *HOT* was an "intelligent menuing" system. For novice users, it automatically built menus for them based on the applications installed on their computer. More experienced users could then tailor those menus to their specific needs.

There was then an extended awkward silence while Tolson continued to try and get *HOT* running for Sinor. After finally clearing *DoubleDOS* from the system, Sinor could finally show *HOT*. He explained that a few minutes earlier, he automatically built a menu system based on the applications installed, which he then showed. (To clarify, this was a demo IBM PC-AT machine provided by the *Chronicles* production staff.)

Free DOS Search Utility a "Labor of Love"

Wendy Woods presented her second and final report, which profiled Vernon Buerg, a programmer who developed IBM PC utility programs and gave them away for free. Woods noted that Buerg had some 50 programs to his credit–utilities that filed, sorted, archived, and even aided in programming itself. He'd been writing them since 1983.

"When you need something done," Buerg told Woods, "a utility program to convert a file or to print it out or whatever, you usually can't find them. Commercial programs don't do those kinds of things." So he ended up writing the programs himself. He added that he started out writing his utilities in BASIC before later moving to assembler.

Woods said Buerg was best known for *LIST*, a utility that allowed you to view and search text files from DOS-level without having to load a word processing program. Like all of Buerg's programs, *LIST* was free. People could get a copy by writing to him or calling his electronic BBS, which operated 24 hours a day from his California home. Buerg said the programs were free because writing them was a "labor of love."

Tackling the Monster Spreadsheet

Karen Lund and Robert Hoffman joined Cheifet and Kildall in the studio for the next round table. Lund was president of Teleware West, Inc. Hoffman was a development manager at Ashton-Tate, the company behind the popular database program *dBASE III*.

Kildall opened by noting that back in the 1970s the heart of the modern PC–the Intel 8086 microprocessor–was designed to use up to 640 KB of main memory. "At the time we thought we could rule the world with that much memory," he said. But the 640 KB limit seemed to be a problem now. What was that restriction actually doing to us? Lund replied that it made it extremely difficult for developers to provide adequate software for applications. People wanted to go beyond the 640 KB limit. Lund said there were two ways to do this. One was the LIM Expanded Memory Specification (EMS), which Lund's company used in developing its utility, *Above Disc*.

Cheifet noted one of the problems was the "monster spreadsheet," i.e. a spreadsheet that was larger than 640 KB in file size. To illustrate, Lund pulled up a spreadsheet with 20,000 cells, which could not load in 640 KB. *Above Disc* provided the expanded memory necessary to actually load that spreadsheet. Lund clarified the "normal solution" to this problem would be to plug in a physical board running the EMS standard. But that could cost upwards of $600 for the additional memory. *Above Disc* implemented the EMS standard in software. It could take any kind of disk file or AT extended memory and use that as expanded memory, which was transparent to the user and their application.

Kildall asked how using a disk file for expanded memory affected performance. Lund said their benchmarks showed the disk file ran about 60 percent as fast as an EMS board. *Above Disc* could also run on floppy disk, which was obviously slower, but it was an option for users with lower-end machines.

Cheifet then turned to Hoffman and asked him about Ashton-Tate's package of utilities for *dBase III*–called, appropriately enough, *dBase Programmers' Utilities*. Hoffman said the program was designed to help with both programming and the programmer's day-to-day activities. It was broken up into three groups. The first was a series of assembly language modules that were callable and loadable from *dBase*. The second group had a database recovery program if a power failure corrupted a file. There was also a debugging, structuring, cross-referencing symbol table-type program, and then a series of DOS-level maintenance utilities. Hoffman demonstrated one of the utilities called *drepair*, which could be used to repair a corrupted database file.

Kildall asked how much the *Programmers' Utilities* package cost. Hoffman said it retailed for $89.95. Kildall and Cheifet agreed that was a good price to pay to recover data if you corrupted your disk.

Were PCs Still in the "Model T" Phase?

For the final segment, Jay Eisenlohr and Ezra Shapiro joined Cheifet and Kildall. Eisenlohr was a vice president with Oregon-based Airus, Inc. Shapiro, a consulting editor with "Chronicles" sponsor *Byte* magazine, previously appeared in an October 1985 episode discussing modems and bulletin boards. George Morrow was also hanging out at the table.

Kildall quipped that the IBM PC-DOS interface was a pretty old one that came from CP/M, and the CP/M interface came from older time-sharing systems, so it was about 20 years old now and it was safe to say that nobody really liked it. He added that the recent approach to this problem has been to replace the entire DOS interface with a GUI like Digital Research's *GEM* or *Microsoft Windows*. But Eisenlohr's company produced a product called *Detente* that tried to "enhance" the DOS interface instead.

Eisenlohr said *Detente* specifically enhanced DOS with an "intuitive processing technology" that went character-by-character or element-by-element and checked the syntax used on the DOS command line. (What he described was basically an autocomplete function.) As the user typed, *Detente* would present a window with choices for possible completion options. The program then pasted the selection onto the command line.

Cheifet wanted clarification on what specific problems *Detente* solved. Eisenlohr said it solved the problem of the command line itself. Rather than hitting `Return` and getting back a bad command or file name, the user was guaranteed to have a successful command. Kildall clarified this was a memory-resident program. Eisenlohr said yes, and it actually built a dictionary of all the user's files and pathnames. Kildall asked about the price. Eisenlohr said *Detente* retailed for $75.

Cheifet wanted to know more about the "intuitive processing technology" behind *Detente*. Eisenlohr said the software did a comparison against the dictionary. He added that the technology could handle dictionaries up to 1 MB in size.

Cheifet asked Shapiro for his thoughts on *Detente*. Shaprio said it looked like it would make a "pretty good safety net" for a person unfamiliar with DOS or who was a rotten typist like himself. But if you were a good typist who knew what they were doing in DOS, a program like this could get in your way. Cheifet asked Shapiro to elaborate. Shapiro said if you wanted to type something other than the choices offered by *Detente* that could be an issue. He clarified that he hadn't seen the product before today, so he didn't know if it was configurable, but his "snap impression" was it looked like it might be a nuisance for the experienced user. Eisenlohr said the program was "totally configurable" and the whole idea of intuitive processing was to customize based on how a user typed. You could easily turn any of the features on and off.

Moving to a more general question, Cheifet asked Shapiro if utilities existed merely because programmers didn’t do the right job in the first place. Shapiro said yes. The question from a user perspective was whether you wanted to drive a car or be an auto mechanic. A lot of these utilities were solutions to problems that were a pain to solve when using a machine. Shapiro said he didn’t want to learn how to run a program just to back up his hard disk. He just wanted to push a button and know that his data was safe.

Morrow pushed back at that. He noted that in the early days of the automobile, if you wanted to drive one you had to be a mechanic. You had to be able to change your tires and adjust your spark plugs. We were currently at the same point with computers. Cheifet said that ideally you shouldn’t have to be a “mechanic.” Morrow retorted that the ideal world and the real world were usually two different things. His point was that today, computers were at the same stage as Model T automobiles. And utility programs were basically the equivalent of some person charging you money to change your tire for you. He noted that without a program like the *Norton Utilities*, you could spend weeks of programming trying to repair a corrupted file. (George spoke from experience here.)

Shapiro said he generally agreed with Morrow. But he was still disturbed by the need for computer users to keep checking and protecting themselves in a way that was not particularly fun and he’d love to see next-generation computers smart enough to automatically handle what utilities do now. Morrow noted he and Kildall went back a ways and they could see today that things were better than they were 10 years ago, and 10 years from now things will likely have improved further.

G-T-P-A-B-6-.-B-9-RETURN-X-A-6-.-9-RETURN-V

Stewart Cheifet presented this week’s “Random Access,” which was recorded in October 1986.

- IBM and Intel signed a deal to develop customized computer chips based on a new design technology called application-specific integrated circuitry (ASIC). Cheifet said the upshot was that IBM might now move away from its own PC standard in an effort to combat the clones by building a new standard around the ASIC chips.

- IBM also projected lower profits for 1986. Cheifet said if that happened it would be the first time since the Great Depression that IBM experienced a decline in profits for two consecutive years.
- ETA Systems of Minnesota announced a new supercomputer, the ETA-10, that could perform 10 billion arithmetic operations per second, which was 40 times faster than a Cray-2 supercomputer. Cheifet said that Florida State University would be installing the first ETA-10 in a few months.
- Lotus Development Corporation formally introduced its much-touted *HAL* interface for *Lotus 1-2-3*, which let users communicate with the spreadsheet software in plain English. Cheifet said that meant you could now command *1-2-3* to `graph column 3 as a pie chart` rather than typing `G-T-P-A-B-6-.-B-9-RETURN-X-A-6-.-9-RETURN-V`.
- Paul Schindler reviewed *ServTech* (Rylos Technologies, $50), an on-line guide to repairing PCs. Schindler noted the program included a diagnostic interpreter to help users understand error messages.
- The Software Publishers Association (SPA) awarded “Platinum” disks to Broderbund’s *The Print Shop* and Springboard’s *The Newsroom*, each of which sold more than 250,000 copies. The SPA also awarded a number of “Gold” disks to programs that sold at least 100,000 copies. Cheifet noted that the two top software publishers on the list were Electronic Arts (6 winners) and Epyx, Inc. (3 winners).
- Microsoft said it would remove copy protection from *Excel* and other Macintosh software packages. Cheifet noted that Microsoft had already dropped copy protection on MS-DOS software earlier in the year. Microsoft now said that with the increased use of hard disks on Macs, copy protection was no longer tenable.
- A hacker known as “Pink Floyd” was suspected of breaking into dozens of university UNIX computer systems including Stanford and MIT.
- Author Dan Gutman recently published a book of 400 “off-beat” applications–Stewart’s description, not mine–for personal computers, including a program written by a Lebanese man for Muslim businessmen who traveled a lot. Cheifet said the program

automatically calculated the times for required Muslim prayer and the direction of Mecca.

XTree Ultimately Swallowed Up by Symantec-Norton Monopoly

Dale Sinor co-founded Executive Systems, Inc. (ESI), in October 1978, with Henry Hernandez and R. Thomas Smith, Jr. The company initially focused on consulting and contract programming. In 1983, ESI hired a programmer named Jeffrey C. Johnson, who would go on to create *XTree*.

Johnson recounted the story in a 1991 article. He said that Hernandez approached him in early 1984 about designing utilities for MS-DOS. Specifically, ESI had recently won a contract with Epson to develop utilities for its new line of PC compatibles. It was in the process of fulfilling this contract that Johnson said the ESI team quickly realized that there was "no way to manage all the files" they were creating, as DOS lacked a file management utility.

After talking the problem over, Johnson said he went home on a Friday and managed to develop a prototype for what became *XTree* by the following Monday. Formal development began in December 1984. Johnson said his wife actually came up with the name *XTree*.

Johnson said that on March 1, 1985, ESI management decided to self-publish *XTree* as its first commercial product. To make things more interesting, Sinor made the call to have the product ready for the 1985 West Coast Computer Faire on April 1–exactly one month later. Johnson said they made the deadline but not without some challenges:

> Two days before the show, [Sinor] went to the typesetters to pick up the final proofs for the manual and discovered the typesetter had been evicted and was ducking everyone. Dale finally tracked him down, but the guy would only exchange the proofs for cash – something we weren't exactly knee-deep in. While the countdown to the West Coast Computer Faire continued, Dale found the cash, got the proofs, rushed them to the printer, then to the bindery, and waited for them, refusing

> to let them out of his sight. He left Los Angeles at 1:30 a.m. Four hours later, he pulled into Moscone Center in San Francisco, carried the boxes of manuals, software cases, cover inserts, and brochures inside, and calmly began assembling the booth. The show opened at 9:00 a.m.

XTree proved an instant success and led to ESI developing several revised and expanded versions–notably *XTree Gold* and *XTree for Windows*–which were later published under the “XTree Company” label. By the early 1990s, however, the consolidation of the computer software market managed to swallow up ESI as well. In October 1993, Central Point Software acquired ESI by merging it with a subsidiary in a stock swap. Six months later, in April 1994, Symantec Corporation acquired Central Point in yet another stock swap valued at $60 million.

Symantec was already a budding monopolist in the PC utilities market, as I discussed in an earlier post. It had acquired Peter Norton Computing, the Godfather of DOS utility companies, back in 1989. And as the *XTree Fan Page* explained in its own history, *XTree* development effectively ended in September 1994 with the release of *XTree Gold for Windows 4.0*. The following year, Symantec released *Norton Navigator File Manager*, which incorporated elements of *XTree Gold* and stayed on the market until 1998. Symantec formally dissolved Executive Systems in April 1997.

Above Disc Maker Fizzled Out Following CEO’s Failed Soviet Perfume Scheme

Above Disc was another utility that had quite a long stay on the market. It was so popular that in 1988, IBM started bundling the software with its expanded memory boards for AT-type PCs. I don’t know exactly when *Above Disc* faded in the market, but the last media references I could find were dated around 1991.

The fate of the company behind *Above Disc* also remains something of a mystery to me. On the program, Karen Lund was identified as president of Tele-Ware, Inc. Lund described her role on her LinkedIn page as the owner and chief operating officer of TeleWare Corporation from 1986 to 1990. But there was another person, Robert F. Rafferty, who seems to have been the real power behind the company.

As best I can tell, the original company was organized in Delaware as Teleware West, Inc., sometime in 1986. In July 1987, Rafferty filed to do business in California as Delaware Teleware West Inc., with him listed as the company's president. In August 1989, Rafferty changed the name of both companies to Above Software, Inc.

So far, that doesn't sound too complicated. But Rafferty also controlled another company organized in Utah. This second company was originally called Cavalier Capital Corporation. Cavalier owned a discount stock brokerage called Los Angeles Securities Group. In May 1986, Cavalier changed its name to that of the brokerage subsidiary. A February 1990 *Los Angeles Times* report described Los Angeles Securities Group and Teleware West as the same company, both under the control of Rafferty as chairman and CEO. My assumption here is that Cavalier Capital/Los Angeles Securities Group acquired the original Teleware West from Lund, but it's not 100 percent clear. (The *Times* report said Rafferty had recently brought in a new president at Above Software, possibly Lund's replacement.)

In any case, Rafferty changed the name of Los Angeles Securities Group to Above Technologies, Inc., in July 1990. The following year, Rafferty was apparently interested in getting out of the software business. The Associated Press reported in February 1991 that Rafferty had tried to sell his 34-percent stake in Above Technologies to finance his plan to manufacture and sell a Soviet Union-themed perfume in the United States. When the sale of his Above Technologies stock fell through, Rafferty was left unable to pay the 20 Soviet women he brought to the United States to sell the perfume, as well as the French company he hired to bottle the product.

Following Rafferty's perfume bust, Above Technologies continued to produce software as until late 1993, when reviews for its file manager utility *Golden Retriever* appeared in the press. But according to Utah corporation records, the company's status "expired" in May 1993. California officials suspended the Above Technologies' foreign company registration shortly thereafter.

As for Karen Lund, she left the tech industry in 1993 after a three-year stint as a product manager at Microsoft. In the late 1990s she managed a Victorian tea shop in Bellevue, Washington. And during the 2010s she returned to school to pursue a degree in mobile web development.

Notes from the Random Access File

- This episode is available at the Internet Archive and has an original broadcast date of October 9, 1986.
- During his cold open, Stewart Cheifet mentioned two of the earliest best-selling utility programs, *The Norton Utilities* by Peter Norton and *Sidekick* by Philippe Kahn's Borland Software Corporation. Peter Norton was a guest on a first season *Computer Chronicles* episode, which as of this writing is a "lost" program not available at the Internet Archive.
- Ed Tolson founded SoftLogic Solutions, Inc., in 1983. The company continued to sell its DOS utilities, including updated versions of *Disk Optimizer* and *DoubleDOS*, well into the early 1990s. SoftLogic dissolved in November 1996, according to New Hampshire corporate records.
- Airus Incorporated apparently did not stick around very long. Barry Obrand, a former vice president for the Businessland computer retailer chain, founded Airus Corporation–later renamed Airus Incorporated–in July 1985. By the time this *Chronicles* episode aired in late 1986, the 12-person company had produced four products, including *Detente* and *Write Now*, a word processor with a built-in spell checker. An analyst report from the period said Airus was financed by about $860,000 in venture capital and had "minimal product revenue" as of July 1986. According to Oregon corporate records, Airus dissolved in 1988. *InfoWorld* reported at the time that Airus licensed some of its technology to Apple and Ashton-Tate. (Obrand actually took an executive position with the latter.)
- Vernon D. Buerg (1947 - 2009) worked as a systems programmer at IBM in the 1960s and 1970s before starting his own company, Buerg Software, in 1976. Although he initially gave away *LIST*, his most famous program, for free as reported by Wendy Woods, that later changed. Burerg told the *Santa Rosa Press-Democrat* in June 1991 that

he now charged a $30 registration fee for a copy of *LIST* with the manual and he planned to sell a retail version for around $100. Buerg also maintained his computer bulletin board service well into the 1990s. Indeed, he met his wife, Julie Ann Dillon, on his BBS. The couple wed in 1988 and remained married until her death in May 2006. Vernon Buerg passed away four years later, in December 2009.

- Jay Eisenlohr left Airus for Mentor Graphics not long after his *Chronicles* appearance. He remained with the latter company until 1992, when he founded Rendition, Inc., one of the first 3D graphics chip companies. Micron Technology acquired Rendition in 1998 in an all-stock deal and Eisenlohr served as an executive with Micron for another three years after the deal closed. In 2003, Eisenlohr co-founded another semiconductor company, Ambric, Inc., and served as its executive vice president until 2009. More recently, Eisenlohr joined BSX, a Virginia-based startup focused on explosives detection, as its chief technology officer.
- An Australian programmer, Kim G. Henkel, developed an *XTree* clone and marketed it under the name *ZTreeWin*, which still has an active website. Rob Juergens also has a UNIX/Linux clone called *UnixTree* that still appears to be under development.
- ETA Systems was actually a spinoff of Control Data Corporation. Six CDC employees convinced management to create ETA Systems in 1983 in order to develop a next-generation supercomputer. The ETA-10 would end up being ETA Systems' only product. According to a 1990 newsgroup post from Rob Peglar, a former ETA manager, the company managed to install 27 of the supercomputers before CDC pulled the plug on the company in April 1989. Peglar blamed CDC's failure to take ETA public and upper management's decision not to use UNIX as the operating system on the ETA-10 as key reasons for the company's demise.
- Bill Gross, then a 28-year-old programmer, created *HAL* for his own startup company that was subsequently acquired by Lotus Development Corporation. Gross told Richard O'Reilly of the *Los Angeles Times* that the name was in no way inspired by the murderous computer in *2001: A Space Odyssey*. Rather, Gross claimed *HAL* "was just meant to be a friendly name."

- As far as I can tell, the “Pink Floyd” hacker was never identified. News reports from 1987 said the United States Secret Service considered the hacker to be a part of a larger group. But while the Secret Service served a few search warrants, there were apparently no arrests made.
- I’ll publish a separate special post in the near future on the SPA award winners and at least one notable omission from its list.

Chapter 6: The Boston Computer Exchange

On August 12, 1991, the Boston Computer Exchange (BCE) held an “Irish wake” for the original IBM Personal Computer. The 10-year-old PC had finally reached the point where it had no resale value, a BCE manager claimed, so it was now time to mark the machine’s “transition from a salable commodity to a donation item.”

The BCE was one of the first used computer dealers in the United States. Even jumping back five years to 1986, *Computer Chronicles* had already taken notice of the growing market for second hand computers. Indeed, BCE’s co-founder was among the guests on this October 1986 episode devoted to the topic.

Stewart Cheifet and Gary Killdal opened the program by looking through the classified ads in a local newspaper. Cheifet pointed to an ad for a used 1983 IBM PC XT selling for $2,495. Cheifet looked up that model in *The Brown Book*, a Blue Book-style guide for used computers, which suggested the machine’s value was closer to $2,380. Cheifet asked Kildall how nervous someone should be about buying a used computer. Kildall quipped he was probably more nervous about buying a new computer given the rapid advances in microprocessor speeds. You might actually be safer buying a used machine.

Ich Bin Ein San Mateo Computer Swap Meet Patron!

Wendy Woods presented her first remote segment from a computer “swap meet” held in San Mateo, California. Woods said these swap meets were notable for their eclectic mix of merchandise, new and used, from printer ribbons to complete systems. But despite their homegrown appearance, swap meets were shaped by the volatile computer market, and dropping prices shifted the balance between new and used gear.

Jim O’Donnell of Microshows, the company that produced this swap meet, told Woods that about 90 percent of the people at the event sold new equipment, with only 10 percent selling used. Three years ago, there were many more used equipment sellers. But as the prices started to drop, the used dealers started selling more lower-end but still new equipment.

Woods added that the changing fortunes of hardware manufacturers left a lot of early computers out in the cold without any software or support. For those “orphaned” computer users, computer trade fairs and swap meets were one way to find help. O’Donnell said it was an especially valuable place to find software vendors. He said this particular swap meet featured three wholesale software dealers who bought out-of-date inventory and sold it at the show.

As for individual vendors of used equipment, Woods said, swap meets presented an opportunity to sell even a small collection of gear to a large group of customers. O’Donnell said these vendors could see 4,000 to 5,000 people in one day looking to buy, as opposed to a couple of hundred people coming to their stores. He added that a swap meet was also a good place to get rid of inventory that sellers wanted to close out.

Even with the shift in sales created by dropping computer prices, Woods said, price brokers estimated that up to 40 percent of the installed base would be resold in the next two years–i.e., as more people bought computers, more used computers became available.

Was It Better to Buy a Used Computer from a Store or a Classified Ad?

J. Mark Couch and Stan Politi joined Cheifet and Kildall for the first studio round table. Couch was president of Interstate Computer Bank, a used computer store in Mountain View, California. Politi was the publisher of *Computer Currents*, a free magazine that listed used computer classified ads.

Kildall opened by asking if customers were generally satisfied with used computers. Couch said there were some “horror stories,” but for the most part people were happy with buying used computers. Cheifet asked what type of people looked for used computers as opposed to new machines. Couch said people buying a second computer typically looked for used computers. These users weren’t afraid of computers, they knew what they were looking for, and they knew how to check them out.

Kildall asked about the most popular computers sold in the used market. Couch said there were a lot of sales of the Apple II+ and IIe models as well as IBM PCs. Cheifet asked Politi about the used models advertised for sale in his magazine. Politi said the most popular were the IBM PCs and clones. He said it was common to see bunches of the same products–such as Compaqs or printers–come in at one time. That made it hard to figure out trends.

Chiefet asked how easy it was to sell a used computer through the classifieds. Did you have to run an ad for a couple of months or just one week? Politi said it usually only took placing an ad once. It was seldom that anybody came back to advertise more than once, as they were able to sell their item quickly.

Kildall asked if people were using methods other than newspaper classifieds or going through stores to sell used computers, such as online systems? Politi said some people used bulletin board systems or put a used machine on a consignment table at a swap meet. It depended on how much time a seller was willing to take.

Kildall asked, a bit nervously, if people were also selling used software. Politi said there was some used software sold. Cheifet quipped, “I wonder where they’re getting it?” (I assume the implication here was that people were selling “pirated” copies of software.)

Cheifet asked Couch and Politi to compare their respective businesses–selling used computers through a middleman versus classified ads–from the perspective of a buyer. What were the advantages of each approach? Couch said they dealt with the buyer one-on-one and provided a warranty on each machine sold. His store had a location where people could come back for help or to purchase other products. Cheifet asked if a customer ended up paying more buying a used computer through Couch's store. Couch said it depended.

Kildall asked what a used machine like the one on the table–an original IBM PC with a color monitor from Couch's store–would cost. Couch said this machine sold for about $1,300. A similar new machine would run about $1,650.

Cheifet asked Politi if people did save money buying through classified ads as opposed to a store. Politi said not necessarily. He noted that from a seller's perspective, going to a reseller like Couch meant you would get your cash very quickly. You didn't have to take the time to sell it yourself.

Cheifet asked Couch where he got his used computers from. Couch said there were a number of sources. Some were individuals looking to sell their personal machines. They also dealt with larger companies getting rid of computers and upgrading. There were also other retailers looking to get rid of overstocked products.

Kildall noted that many customers were concerned about whether a used computer was in good shape. With that segue, he asked Couch to demonstrate a program called *Interrogator* by Dysan Corporation, on the previously mentioned IBM PC. Couch explained that *Interrogator* allowed a user to check the disk drives on the PC for possible faults without opening up the machine. Couch ran the program and checked both of the drives on the PC. (Kildall quipped he always seemed to end up with computers that had one disk drive that didn't quite work right.)

Kildall asked what other things a customer should look for before buying a used machine. Couch said you should always try to boot the machine, as that performs a memory check and shows that it will read a DOS disk. Cheifet asked Couch to demonstrate the memory check.

Chiefet turned back to Politi and asked him about the hardest machines to sell. What were the "dogs" that people couldn't sell? Politi said computers based on the old S-100 architecture and the "plain, vanilla CP/M machines" that nobody wanted anymore. (There was some laughter around the table at

Kildall’s expense.) He added that people tended to sell not because they were looking to get out of computers, but rather to upgrade to a better system.

Cheifet asked if there was much of a market for lower-end machines like the Commodore and Atari 8-bit computers. Politi said he didn’t see many ads for those. Many people ended up giving such machines away to charity and taking a tax-deduction instead. He noted there were a lot of nonprofit groups advertising in *Computer Currents* looking for such donations.

The group turned its attention back to Couch, who was still running that memory test. He explained the test produced a “201” error, indicating a bad RAM chip. The program gave the location of the failed chip. Couch then pulled out another demo motherboard to show the location. Kildall asked how much it would cost to fix the problem. Couch said it only cost about $1 to buy a new RAM chip.

Orphaned Osbornes Continued to Find User Support

Wendy Woods presented her second remote segment, this time covering a meeting of a users group for owners of Osborne computers. Woods noted that Osbornes were now considered “orphaned” computers, i.e. machines that were no longer made by companies that no longer existed. So when an orphaned machine like the Osborne Executive broke down, you had to know how to fix it yourself or join a users group like the San Mateo chapter of First Osborne Group (FOG).

Woods said that FOG had 135 U.S. and 22 foreign chapters. Each month, members gathered to hear speakers, make their own copies of public domain software, exchange information, and get help. This allowed users to get help with software and hardware that could not be found anywhere else. In the San Mateo FOG, two members had businesses repairing Osbornes and they brought their tools to the meeting. Jim Switz, a member of the San Mateo FOG, told Woods that when he started attending the group, he got all of his questions answered within the first couple of meetings. Eventually, he started answering other members’ questions, so you paid back what was given to you.

Woods said that roughly 250,000 Osborne computers were sold prior to the company’s bankruptcy in 1983. Since then, the user groups had kept the machine alive. Ron Herman, an Osborne owner and FOG member, told Woods that just because the companies went out of business, it didn’t mean their products weren’t still out there doing a good job. Herman noted that he’d been using his Osborne 12 hours a day, 7 days a week, for 6 years and the machine had never given him any trouble. So he planned to keep the Osborne until it died.

An Online “Virtual Inventory” of Used Machines

Alex Randall and Brad Ruedig joined Cheifet and Kildall for the next segment. Randall was the founder of the Boston Computer Exchange. Ruedig was a vice president with C.A.S. Computers, a chain of four used computer stores in Chicago.

Kildall asked Randall to explain how his company’s service differed from the retail or classified approaches to selling used computers discussed during the prior segment. Randall said the Boston Computer Exchange (BCE) was an online service available all over the world. People could log onto BCE’s database and do a search. He then provided a demo using a computer in the studio to search BCE for a used IBM PC-AT. The software asked for the highest price the user was willing to pay. Randall entered “$5,000.” This search produced seven results. Randall pulled up the first search result, a July 31, 1986, listing for a 10-month-old IBM PC-AT with 512 KB of RAM, 20 MB hard disk, color monitor, and printer, selling for $3,400.

Kildall asked how lower-priced PC clones were affecting the used computer market. Randall said the used market always stayed just a little bit under whatever the current IBM prices were. A new clone typically sold for the same price as a used IBM PC model, which was about 20 to 30 percent below list price.

Kildall asked Ruedig what a customer should look for–or avoid–when buying a used computer. Ruedig said first and foremost, it was important to make sure that a used system still included all of the original hardware and software manuals. It was difficult to purchase this documentation outside of buying the computer. You also wanted to check the cables were complete and had no burns on them–especially printer cables, which can cost between $30 and $50 to replace. You also wanted to copy files from one disk drive to another, which tested their reading and writing abilities.

Turning back to Randall, Cheifet asked about the size of BCE's database. Randall said they kept about 1,000 machines on hand at all times in a "virtual inventory." Cheifet asked about the cost of the service. Randall said the buyers paid nothing. The sellers paid a 10 percent commission. So there was no cost to buy or list equipment.

Cheifet asked if there were any practical concerns with buying from a national database–e.g., a buyer in San Francisco couldn't physically inspect or test a machine sold from Boston. Randall said BCE acted as a neutral intermediary who made sure both the buyer and seller were happy.

Somewhat repeating the previous segment, Cheifet asked Ruedig to run a diagnostic disk program included with a Leading Edge PC clone in the studio. (Leading Edge was the presenting sponsor of *Chronicles* this season.) Ruedig ran a keyboard diagnostic that tested all of the keys on the keyboard. He then ran another test for the monochrome monitor, which demonstrated the 80-column display and tested various graphics modes.

Cheifet asked if there was a "generic" diagnostic diskette available. Ruedig said no, diagnostic disks were typically made for specific computers. Sometimes only service facilities in computer stores had access to these disks. But companies like Leading Edge provided their own diagnostic diskettes with the computer. Ruedig added that if you bought a used computer with a hard disk drive, it was best to let a service organization take a look at it beforehand.

Cheifet asked Randall whether buying a used computer was more risky than buying a new computer. Randall said it was actually less risky. New equipment tended to fail because the chips hadn't burned in yet. With older equipment, the chips had a chance to burn in, so you knew that the electronics were safer. There was still a potential issue with mechanical equipment, such as disk drives and printer heads, but overall he thought used machines were very sound. Kildall followed up, asking whether peripherals like printers were subject to more wear and tear. Randall said they were due to their mechanical nature and thus required more testing.

Was There a Viable Used Market Without IBM Support?

For the final segment, George Morrow showed up to throw cold water on the whole subject of buying used computers. He said that for a good used computer market to exist, you had to have lots of customers, and we didn't have that yet. It wasn't like the market for used cars. You don't have manufacturers that support their used computers. He'd believe in the used computer market when a company like IBM started accepting trade-ins. On the other hand, he noted there was a durable market for used mainframes and large tape drives.

Kildall repeated his earlier question about the effect of lower-price PC clones on the used market. Morrow said the clones had to be hurting the used market. He said the clone makers typically priced their machines 20 to 30 percent under IBM and offered more features. So if a used computer was the same price as an IBM, so what? You could buy a better clone for the same price.

Apple's Bottom Line Improved Despite IIgs Shipping Delays

Stewart Cheifet presented this week's "Random Access," which was recorded in October 1986.

- Apple was reportedly having problems with the custom chips for the Apple IIgs, so it would not meet its goal of getting quantities of the new machine to market before Christmas 1986. Cheifet added there were also reported problems with the IIgs operating system.

- Apple also reported its quarterly net income was up 150 percent over 1985 and earnings-per-share were up more than 140 percent, primarily due to the company’s recent cost-cutting efforts.
- IBM reported a 27 percent drop in third-quarter earnings, which the company blamed on weak overseas sales and low capital spending in the United States.
- A federal judge ruled in favor of Broderbund’s lawsuit against Unison World over the latter’s *The Printmaster* software, which Broderbund argued copied the “look, sequence, and structure” of its program *The Print Shop*. Cheifet noted this was the first time that a U.S. court had extended copyright protection to the look-and-feel of non-game software.
- Wang unveiled a new laptop computer with a built-in printer and an electronic disk drive. Cheifet said the machine weighed 14 pounds and would sell for $3,500.
- A Wyoming-based company called TL Computing announced plans to produce the “Worm,” a $700 computer that could run Apple IIe software but was not technically an Apple II clone.
- Commodore denied reports that it was halting production of the Commodore 128 and said that sales of the machine were healthy. Cheifet said there were rumors that Commodore would dump the 128 in favor of a new Commodore 256.
- Paul Schindler reviewed *Mean 18* (Accolade, $45), a golf game that took advantage of newer EGA cards on the IBM PC.
- Javelin Software announced a special promotion for its *Javelin* spreadsheet program, knocking the price down from $695 to $99.95 for the next 10,000 copies purchased directly from the company.
- The American Bar Association gave its approval to approximately 20 legal software packages.
- Lawyers in Southern California started their own computer bulletin board system.
- Scientists at Portsmouth Polytechnic Institute in the United Kingdom were studying cockroaches to help them design a six-legged robot. ## Randall Tried to Bring 1960s Ideals to the 1980s/1990s Used Computer Market

Perhaps the most noteworthy guest from this episode was Alex Randall–formally Alexander Randall, 5th–who founded the Boston Computer Exchange (BCE) with his wife, Cameron Hall. Randall, a Quaker who had been active in the movement against the Vietnam War while a student at Princeton University, told Jane Meredith Adams of the *Boston Globe* in October 1985 that he wanted to "make 1960s ideals work in a 1980s world" and that "[t]he answer was computers."

According to Adams, Randall and Hall started BCE sometime in 1981 or 1982, although Massachusetts records indicate they did not formally incorporate the business until January 1985. Randall served as president with Hall as vice president of finance. One of Randall's cousins oversaw operations. In 1984, Randall said over $1 million in used computers were traded on BCE.

Essentially, BCE was kind of an early version of eBay, although the process still involved quite a bit of human intervention, as Peter McWilliams of Universal Press Syndicate explained in a May 1990 column:

> If you're a seller, you call BCE and give your listing, giving such information as your model, its age, and what legitimate software comes with it. The company then posts a listing in its databank as well as on CompuServe and a few other information services. (On CompuServe, type "GO BCE.") A listing goes for $25. BCE can appraise your computer, too.
>
> If you want to buy a used computer, you call BCE and the company arranges for you to pay for it through an escrow service. The seller then sends you your computer. You have 48 hours to try it out and make sure it is what the seller says it is. If it's not, you can send it back and get your money back from escrow, or you barter with the seller and get an adjustment price.
>
> At the end of 48 hours, if everything is fine, the seller gets the money out of escrow, minus a 10 percent commission to BCE and $25 to the escrow company.

BCE started working with CompuServe in November 1986, shortly after Randall appeared on *Chronicles*. The company also later published a written "index"–known as the BoCoEx–that tracked prices for popular used computers, much like a listing of stock quotes. Wendy Woods' *Newsbytes* actually published BCE's weekly table of used computer prices from 1989 to 1993. And in 1991, Randall launched an unsuccessful effort to sell "seats" on the exchange, which offered third-party brokers access to BCE's database for $20,000 plus a 2 percent commission on all sales.

It was also during the early 1990s that Randall expanded his ambitions internationally towards the collapsing Soviet Union. In August 1990, he co-founded the East West Education Development Foundation with Patrick McGovern, the chairman of computer publishing giant IDG. The foundation provided used computers and related equipment to people in the Soviet Union and other countries in eastern Europe. Randall told *Newsbytes* in September 1990 that in the absence of hard currency, he sold several used computers to Moscow's Academy of Sciences in exchange for a "hard disk with a layer of diamond on it." Randall subsequently tried peddling these supposedly "indestructible" diamond hard disks at the fall 1990 COMDEX show in Las Vegas to no avail. The foundation later shifted its focus to corporate donations of discontinued and abandoned computer systems.

In September 1993, Randall added talk radio personality to his list of jobs, co-hosting a two-hour weekly syndicated program called "The Computer Exchange" on Boston's WSSH. By this point Randall's role at BCE had diminished. In 1990, BCE signed an affiliate agreement with ValCom, a Nebraska-based chain of 275 computer stores, which accepted used computer trade-ins based on the BoCoEx index. In 1991, ValCom merged with Inacom Computer Centers to form InaCom Corporation, which in turn acquired an 80 percent stake in BCE. Randall, who continued to own the remaining 20 percent with Hall, officially left the company in July 1994.

At the time, Randall said he planned to devote himself full-time to the work of the East West foundation. But by the summer of 1995, he'd left his position there as well and moved to the U.S. Virgin Islands. Randall told a Princeton alumni newsletter in 1998, "I got tired of law suits, I got tired of three-piece suits, and I got tired of snow suits." So he decided to semi-retire and focus on spending more time with his wife and three young children. Sadly, six months after the family moved to the Virgin Islands, Cameron Hall was diagnosed with incurable lymphoma. In recent years, Randall has worked primarily as a teacher, serving as an adjunct professor at the University of the Virgin Islands.

The Boston Computer Exchange's business essentially disappeared into InaCom, which at one point was the third-largest computer distributor in the United States, according to FundingUniverse. BCE continued to exist, at least on paper, until the early 2000s. By that point, InaCom was in the midst of lengthy bankruptcy proceedings in Delaware. The bankruptcy court formally dissolved BCE in March 2004. As for the East West foundation, it stopped filing corporate reports with Massachusetts authorities in 1999. ## Notes from the Random Access File

- This episode is available at the Internet Archive and has an original broadcast date of October 16, 1986.
- Mark Couch co-founded Interstate Computer Bank sometime in 1983 or 1984. Based on California corporate records, the active business only lasted a couple of years. California officials suspended the parent company's registration in 1988 and again in 1991, the latter time for good.
- Stan Politi started *Computer Classifieds* as a free, local magazine in San Francisco in 1983. Later renamed *Computer Currents*, Politi franchised the *Currents* brand to publications in other cities. He remained president of the Computer Currents Publishing Corporation until 2000, when he sold the business to the publisher of Minnesota-based *ComputerUser*. *Computer Currents* ceased publication in March 2000 and thereafter merged into *ComputerUser*, which continued publishing until early 2022. As for Politi, during the 2010s he ran an artisan bakery in Oregon focusing on Italian biscotti and gourmet dog treats.
- I couldn't find any evidence that TL Computing ever manufactured or sold its not-an-Apple-II-clone Worm machine. An October 1986 Associated Press report said TL's founders, Mike Lieberman and Randy Tucker, previously sold a PC-XT clone called the Mizer XT. The pair told the AP they planned to assemble the Worm computers

themselves and sell them to local school districts. (Tucker was a high school teacher.)

- The Commodore 256 never actually came to market. According to Dave Farquhar, Commodore did design a 256 prototype sometime in 1986 or 1987, but unlike the Commodore 128, the 256 would not have been compatible with the existing Commodore 64 software library.

Chapter 7: Fontographer, the Radius Full Page Display, DeskTop Art, and Ready, Set, Go!

In September 1986, roughly 1,000 people attended the first Seybold Conference on Desktop Publishing, where the featured speaker was exiled Apple co-founder Steve Jobs. As usual, Jobs was desperate for attention, so he proceeded to insult the participants by telling them, “You’re here at a $600,000 event to talk about a non-existent industry in two years.” According to Wendy Woods’ *Newsbytes*, Jobs apparently believed that companies would soon offer “computers with built-in software for desktop publishing,” rendering the standalone software market obsolete. (Spoiler: That didn’t happen.)

The hippie grifter no doubt resented the fact that desktop publishing (DTP) had saved his beloved Macintosh from the same ignominious fate as the Apple III and the Lisa. As Woods noted in that same report, by late 1986 Apple “was selling one laser printer for every three Macintoshes.” On the software side, Paul Brainerd of Aldus said his company had already sold 30,000 copies of its *PageMaker* DTP package, which was super numbers for a Macintosh program of the time.

Brainerd appeared on the next two *Computer Chronicles* episodes, which were dedicated to the growth of desktop publishing. This first episode from October 1986 focused on the Macintosh side of the market. Stewart Cheifet noted in his cold open that DTP software enabled small groups like a community association to produce its own newsletter. Another example was *ComicWorks*, a Macintosh DTP package used to make comics, which he showed to Gary Kildall in the studio introduction.

Cheifet reiterated that DTP had made–and perhaps saved–the Macintosh. Kildall added that the IBM PC standard originally included only a character-based display and only later adapted CGA and EGA graphics. And DTP required a hi-resolution display like that of the Macintosh, even if it wasn’t in color.

Putting the “Power of the Printed Word” Within Reach of Everyone

Wendy Woods presented her first remote report, narrating some B-roll footage taken at Highlights Electronic Publishing Company, a desktop publishing shop in Oakland, California. Woods said the successful wedding of computers, lasers, and printers was on the verge of transforming traditional publishing and printing at every level. For the small business, DTP meant having near total control over the design and printing of small documents.

At Highlights, Woods said, owner George Poor combined electronic communications with desktop printing to provide a complete, self-contained newsletter publishing service. His clients spanned the globe, from a local nursing association to trans-Pacific teleconferences. DTP created a new category of printing professionals like Poor, who could take an unproofed memo from halfway around the world, strip off the original formatting, and clean up the document like an ordinary word processing job. Then using a program like *PageMaker*, he composed the layout of the document from text to tiles to graphics–all on his Macintosh. The final step was the printing, usually done on the spot with a LaserWriter.

Woods said that while the impact of electronic publishing had just begun in the professional world, it was easy to see its appeal to individual publishers. DTP was relatively inexpensive and fast. It used common hardware. And the print quality, while not yet up to photo typesetting, was fine for smaller jobs. But best of all, DTP put the power of the printed word within reach of everyone.

This Episode Was Brought to You by the Letter “B”

Michael Tchong and Richard A. Ware joined Cheifet and Kildall for the first studio round table. Tchong was vice president of marketing with Manhattan Graphics Corporation. Ware was a font designer with CasadyWare.

Kildall opened by asking Tchong what DTP offered the average Macintosh customer. Tchong said it offered a significant cost savings and something that was previously not achievable using software like spreadsheets and databases. He said there were studies that showed people could save as much as 50 percent.

Kildall asked about the specific uses of DTP. Tchong said newsletters were the most common application. But he expected that would change as people realized the power of DTP to prepare other types of documents such as memos and letters.

Cheifet followed up on the cost savings claim, clarifying that was compared to taking a printing job to an outside printing house. Tchong said that was correct. He added that people were also now starting to produce documents using DTP that would have previously just been typewritten.

Kildall asked Tchong to demonstrate his country's DTP program *Ready, Set, Go!* (I'll just refer to it as RSG.) RSG was page layout software. Tchong started the demo with a new, blank document. He created a text block. He said RSG allowed for free-form design, so the user could place pictures anywhere they liked in combination with text columns. Text could be typed in directly or brought into the program. RSG supported multi-column layout so text "automatically flowed" from one column into the next. There was also an optional grid that helped the user line up their text columns and graphics. Tchong then demonstrated how to add a graphic to a document as well as how to change the font size.

Cheifet noted this was the third version of RSG that Manhattan Graphics had published for the Macintosh. What was new about this version? Tchong said the initial product lacked the typographic features that customers wanted. The new version had those features, such as kerning and hyphenation. Cheifet asked what "kerning" was. Tchong said it was simply the ability to move letters closer together. For example, if you had a "t" and a "y," the "y" was tucked under the "t."

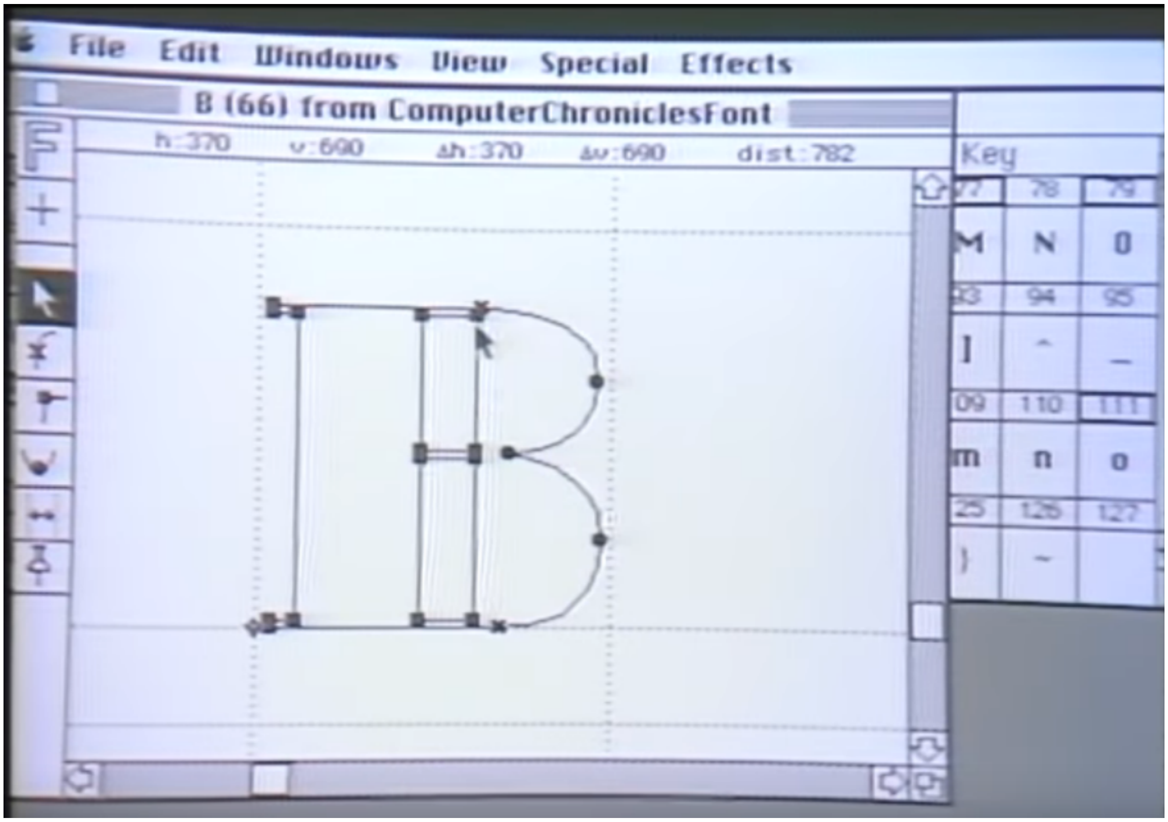
Cheifet asked Tchong to show a sample document created with RSG and printed on an Apple LaserWriter. Tchong handed Kildall a sample "Memo."

Cheifet then turned to Ware and asked him why fonts were important. Why did you need a choice of different fonts? Ware said fonts communicated more than just the words–it communicated the feeling. Fonts gave particular words more impact. It could communicate a formal or informal feeling.

Cheifet noted that Ware designed fonts using a program called *Fontographer*. How did Ware actually create a font? Ware explained that with *Fontographer* he created the outline of the font and the outline description, which was then translated into the PostScript language used by the LaserWriter. Cheifet clarified that Ware made custom fonts as opposed to buying an existing font package.

Ware said yes, he made the fonts from the “ground up” and sold them as a product.

Ware then provided a demonstration of *Fontographer*. There was a grid displaying all of the possible character locations. By default this grid showed the Macintosh system font. He selected one of the characters–the “B”–and a separate window appeared showing the points and paths that made up the letter (see image below). You could then zoom in up to four levels and manipulate the individual points. Each of these points had a pair of Bezier control points, which could be used to alter the curved lines within the character.



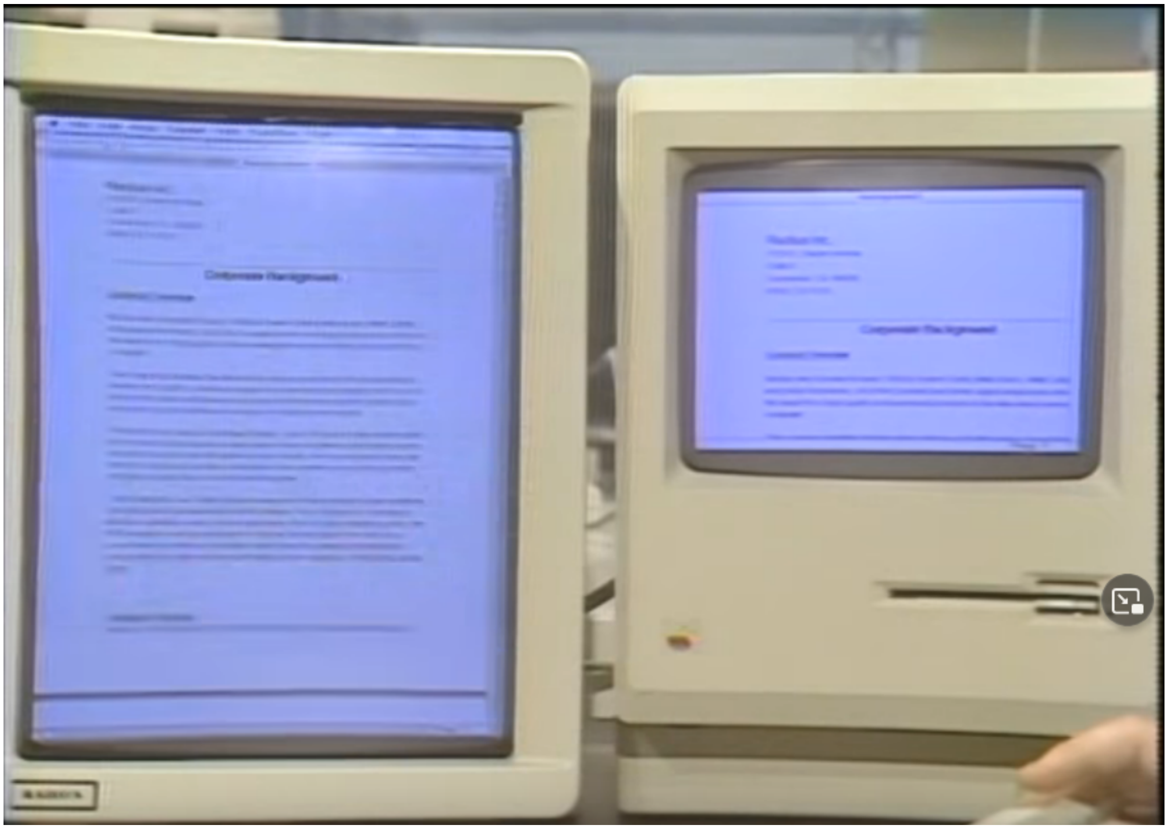
A screenshot from the program “Fontographer” running on a Macintosh 512K. There is a drawing of a letter “B” in the center of the screen showing the various points and lines that make up the character.

Kildall asked Ware what he looked for when designing a font. How did you make it all look the same? Ware said it was an art form. You had to make sure that when you read a page of text, you didn’t have some parts looking “heavy.” There was lots of tradition behind font design but it was still possible to be creative.

Giving the Mac a Properly Sized Display

Michael Boich and Randy Kincaid joined Cheifet and Kildall for the next round table. Boich was president of Radius, Inc. Kincaid was a manager with Dynamic Graphics, Inc.

Boich was there to demonstrate the Radius Full Page Display, an external monitor for the Macintosh. Kildall quipped it was a great product for people like him who lacked 20/20 vision and couldn't read the tiny Macintosh screen. Boich presented his demo using a word processing program called *WriteNow*. He first showed a sample document on the built-in Macintosh screen, which only displayed about one-third of an 8.5-by-11-inch page. He then opened a second copy of the same document on the Radius display, which showed the entire page (see image below).



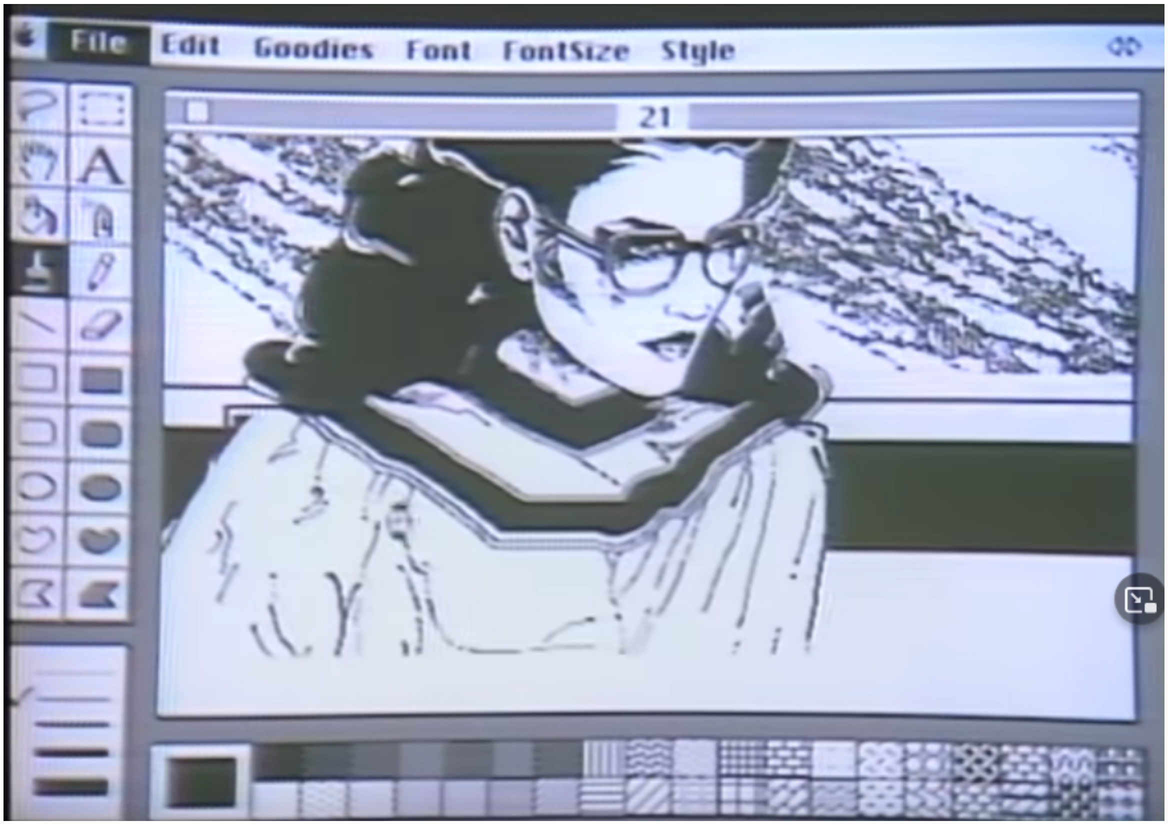
A Radius Full Page Display sitting next to a Macintosh 512K computer on a desk. There is a full 8.5-by-11 inch document displayed on the Radius, and a smaller portion of that same document displayed on the Macintosh screen.

Kildall asked about the resolution of the Radius display. Boich said it was identical in dots-per-inch to the original Macintosh display. But in terms of total pixels it was 640-by-864. For comparison, the Macintosh display was 512-by-342 pixels. So the Radius offered about triple the area of the built-in display.

Cheifet noted that you could work with both the built-in and Radius displays at once. Boich showed how you could move the Macintosh cursor “across” the screens seamlessly. You could also span a single window across the two displays. Boich said a more common use of the two-display setup was to work on a document on the Radius while using an accessory or tool on the built-in display.

Cheifet turned to Kincaid and asked about his company’s product, *DeskTop Art*. Kincaid said *DeskTop Art* was “art for everyone who’s not an illustrator.” It contained the work of professional illustrators stored on software. (In other words, it was a bunch of clip art disks.) So instead of buying a paper volume of clip art that you had to cut out using scissors, you could use clip art provided on a disk.

Kincaid demonstrated *DeskTop Art* using *MacPaint*. *DeskTop* art came with a printed index of images, which showed the specific folder locations of each image on the program disks. So you looked for the image you wanted in the index and then went to the corresponding folder number. For his demo, Kincaid picked an image of a woman in glasses, or what he described as a “very pretty teacher” (see image below).



A piece of clip art displayed in “MacPaint” for the Macintosh 512K. The clip art is a black-and-white illustration of a white woman in three-quarter profile with long, dark curly hair and eyeglasses.

Kildall asked Kincaid how you actually brought the image into a document. Kincaid said all of the page composition software for the Macintosh–including *PageMaker* and the previously demoed *Ready, Set, Go!*–could import these images, which were in the Macintosh PICT format. So you could easily import any of the images just by pressing a couple of buttons.

Kildall asked if it was possible to scale an image, for example to make it smaller. Kincaid said that was difficult to do with *DeskTop Art* since these were bitmap images. But many of the page composition programs were capable of doing some scaling. Chiefet asked if you could actually edit or manipulate images with *DeskTop Art*. Kincaid said yes, you could invert or flip an image.

Kincaid then pulled up another sample file from *WordArt* using *MacDraw*. In this case, it was a sheet containing several clip art images. Kincaid copied one of the images–a girl reading a book–and pasted it into a new document. He also showed that you could modify the image by breaking it down into the individual objects used to create the illustration in the first place.

Chevron Moves Internal Newsletter to DTP

Wendy Woods returned for her second and final remote segment, this time from Chevron Corporation in San Ramon, California. Woods said the biggest test of desktop publishing was taking place in corporate offices like this one. Here, the company's personal computing services center used a small network of Macintoshes running *PageMaker*, a LaserWriter, and an IBM PC-AT as a file server. With this setup, Woods said the center produced *Pacer*, a newsletter about personal computing that went out to 3,500 Chevron employees.

One year earlier, Woods said, *Pacer* was still being made with a mainframe editor and without the benefit of the versatile fonts and graphics of the LaserWriter. The process used to take 6 to 8 weeks. Mary Neff, a Chevron employee, told Woods that when desktop publishing came out, they were able to finally merge text and graphics and explain some very complicated technical issues to her readers. This led to an increase in readership. Neff added the turnaround time for producing a document was also much quicker with DTP. She could put out a draft copy, get the changes back, edit them, and get the newsletter out within a one-month lead time.

Woods said the DTP system gave the Chevron staff more control over their finished product and plenty of praise for its format and style. The center had only been using the system for only about a year but already it was considered an overwhelming success–so much so that other offices within Chevron and even other Fortune 500 companies had been calling to ask for help in setting up their own DTP system.

PageMaker Users Had a List of Demands

Paul Brainerd, the president of Aldus Corporation, was the final guest for this episode. Stewart Cheifet noted that Brainerd invented the term "desktop publishing" and developed *PageMaker*. Kildall asked how far back did DTP actually go. Brainerd said we were only talking about a year to 18 months.

Kildall asked about the beginnings of DTP. Brainerd said his background was in the publishing business, specifically newspapers and journalism. He saw that it was possible to take microcomputers and combine them with laser printing technology and software like *PageMaker* to produce a solution for people who wouldn't have had access to these tools before.

Kildall wondered if DTP was an actual substitute for manual typesetting or just a replacement for a typewriter. Brainerd said it was both. DTP offered a more professional result than what word processing could do alone. It might be short of what you needed to produce a book or a magazine, but it could do everything in-between

Cheifet brought up the Steve Jobs quote that I referenced earlier. He characterized Jobs as claiming that DTP would just evolve into “one big fancy word processor.” Did Brainerd think that would happen? Not necessarily, Brainerd replied. He said in the long-term that word processing would fully integrate text and graphics. But there would be a wide range of products available as not everyone needed the ability to combine text and graphics.

Kildall asked about what was missing from current DTP packages. What were people asking for? Brainerd said that Aldus had a running list of user requests and there currently contained 270 items. Users wanted more typographic capabilities, hyphenation support, kerning, and larger page sizes, just to name a few things. Cheifet noted that *PageMaker* recently released its 2.0 update for the Macintosh. What new features were added? Brainerd said it covered the items he just mentioned.

BBS Users Fight Trojan Horses

Stewart Cheifet presented this episode’s “Random Access,” which was recorded in October 1986.

- Bulletin board users were starting to take action against “cracked hackers” who planted “Trojan horse” software on systems.
- Lotus announced its new word processing program *Manuscript*.
- IBM announced its own brand of desktop publishing software for the IBM RT PC.
- Hayes Microcomputer Products introduced new versions of its Smartmodem and Smartcom II modems for the IBM PC Convertible.
- The Reader’s Digest Association was reportedly exploring a sale of its online service, The Source.
- Paul Schindler reviewed *Get!* (Signet Technologies, $89), a program that automatically checked electronic mail services at specific times or intervals.
- IBM, Commodore, and Sony were among the major western companies buying more software from Communist-controlled Hungary.

- Mississippi farmers were testing two new software programs designed to measure variables such as weather conditions and plant growth. Cheifet said that one cotton farmer was able to double his crop output per acre using the software.
- Texas A&M University was the first school to adopt an "online" class registration system that allowed students to select their courses by using their touch-tone phones.
- The ENIAC recently celebrated its 40th anniversary.

Boich Ran the Personal Computing Triathlon

Michael Boich started his tech career at Apple. Indeed, he was part of the team at Apple that originally developed the Macintosh. He is often credited as Apple's first "software evangelist," i.e., someone charged with aggressively marketing the Mac to third-party developers. In that role, Boich helped forged the early relationship between Microsoft and Apple, with the former developing *Excel* and *Word* among other programs for the original Macintosh.

Boich later expressed frustration with Apple's decision to sue Microsoft over allegations that Windows infringed on copyrights Apple claimed for the Macintosh operating system. In an April 1988 interview with Laurie Flynn of *InfoWorld*, Boich said the lawsuit was "probably not worth it." He also shared this telling anecdote of a confrontation between the public faces of the two budding tech giants:

> My favorite story was about being in this meeting one time when Steve Jobs was complaining about the Windows development Microsoft was doing because they were still working on Mac stuff and nondisclosed on things. Apple's programmers thought Apple was giving away the store by letting Microsoft have Macs. To this [Microsoft chairman] Bill Gates said that the Windows people don't get to see the Mac stuff, that they're different programmers from the Windows developers.
>
> Steve insisted that wasn't the point. He said it was more like if Bill's big brother punched Steve's big brother in the nose, people would say the Gateses were beating up on the Jobses.
>
> To this Bill said: "No, Steve, it's kind of like if we had rich neighbors named Xerox, and I went in to steal their TV set, and you said, 'Hey that's not fair, I wanted to steal that set.'"

In 1986, Boich and three of his colleagues left Apple to start Radius Inc. Radius' first two products were the Radius Accelerator, a Macintosh expansion board that added a second microprocessor; and the Radius Full Page Display that Boich demonstrated in the episode, which originally retailed for $2,000. These products were successful in the hi-end market and Radius continued to develop a variety of Macintosh-related products through the early 1990s.

Boich took Radius public in 1990, served as CEO until 1994, and stayed on as chairman until 2000. In 1995, Radius became the first company to manufacture an Apple-licensed Macintosh clone. But as Luke Dormehl noted in an article for *Cult of Mac* earlier this year, the deal didn't really work out for either company:

> As per the deal Radius signed, the clone-maker only paid Apple $50 per machine produced. Apple thought the clones would increase Mac market share. However, the strategy actually cost Cupertino money. It stopped people from buying Macs directly from Apple, without enlarging the size of the overall pie.
>
> Radius stopped making the System 100 computer in January 1996. The company then sold its Mac license to Taiwanese scanner manufacturer Umax Data Systems in May. The following year, when Steve Jobs returned to Apple and began to turn the company in the right direction, he pulled the plug on clone Macs.

Despite the clone failure, Radius continued to chug along as a manufacturer of high-end video production tools. In 1999, the company changed its name to Digital Origin Inc. Three years later, in January 2002, Media 100 purchased Digital Origin in an all-stock deal valued at $83 million. This turned out to be part of an ill-fated buying spree by Media 100, which filed for bankruptcy a year later.

As for Boich, he followed up his tenure at Radius by co-founding another startup, Rendition, Inc. Abandoning Boich's Apple roots, Rendition focused on developing a 3D graphics engine for the PC platform. After a three-year tenure as CEO, Boich sold Rendition to semiconductor giant Micron Technology in September 1988 in an $88 million all-stock deal.

Boich's next startup was Eazel, Inc., which he co-founded in 1999 with former Apple and Radius colleagues Bart Decrem and Andy Hertzfeld. Completing Boich's personal computing triathlon, Eazel tried to develop a Linux user interface for the consumer market. That didn't last long. Eazel closed up shop in January 2002 after just 16 months. That said, Eazel's legacy continued in the form of Nautilus, a graphical file manager designed by Hertzfeld, which continues to be part of the Linux GNOME desktop today.

Eazel was Boich's last CEO gig. During the 2000s he did the usual corporate board and venture capital gigs. His last known position was as a board member at Federspiel Controls Inc., now known as Vigilent, a company that develops HVAC control systems. (Mark Housley, who previously served as CEO of Radius/Digital Origin, is Vigilent's current chairman and CEO.)

Notes from the Random Access File

- This episode is available at the Internet Archive and has an original broadcast date of October 16, 1986.
- Richard Ware designed fonts for a company known in 1986 as CasadyWare, Inc. Robin Casady started the business in 1984 specifically to develop downloadable PostScript fonts for the Macintosh. He formally incorporated the business as CasadyWare in November 1986 just after this episode aired. In March 1989, CasadyWare merged with J. Michael Greene's Greene Software Inc. to form Casady & Greene, Inc., which continued to operate as a general software publisher for Apple's platforms until July 2003.
- The program that Ware demonstrated, *Fontographer*, was originally developed by Altsys Corporation. Macromedia, Inc., acquired Altsys in 1995 and continued to update and release *Fontographer*. FontLab Ltd. subsequently acquired the program's rights from Macromedia after Adobe Systems bought the latter in 2005. FontLab produces its own font editing software, also called *FontLab*, but continued to publish *Fontographer* up through the release of version 5.2 in 2012.
- *Ready, Set, Go!* (RSG) was first published by Manhattan Graphics Corporation in 1985. It was positioned as a lower-cost alternative to *PageMaker*, with the 3.0 version demonstrated on *Chronicles* initially retailing for $295 in late 1986 versus $495 for the Aldus product. Manhattan Graphics subsequently sold RSG's publishing rights to Esselte LetraSet, an office and graphics arts supplies company, in 1987. Esselte split the product into two lines, a $300 RSG and an $800 program called *DesignStudio*. Manhattan Graphics reacquired the rights to the lower-end RSG in 1992 but by then the product had lost too much ground in the market. Esselte subsequently sold its rights in *DesignStudio* to Diwan Software Limited in 1996. Diwan, a London-based company, continues to sell a Windows version called *Ready, Set, Go! Ruby* and an Arabic-language counterpart called *al-Nashir al-Sahafi Yaqout*

- Michael Tchong followed up his work at Manhattan Graphics by starting *MacWEEK* magazine in 1987. Short of cash, Tchong sold 50 percent of the magazine to publishing giant Ziff-Davis a year later. He eventually left *MacWEEK* altogether in 1991 after feuding with Ziff management, according to a 1994 *Wired* article. In the 1990s, Tchong founded Atelier Systems, a communications software company, and ICONOCAST, an Internet marketing company, both of which he quickly sold. Today he promotes himself as a “futurist” and public speaker.
- Paul Brainerd was also a guest on the next episode I’ll be reviewing, so I’ll delve more into him and *PageMaker* at that time.
- As I discussed in a previous post, the Reader’s Digest Association did eventually sell The Source, although that did not actually take place until March 1989, when it was bought by CompuServe. (Wendy Woods’ *Newsbytes*, which I cited in my introduction, was published on The Source during this time period.)
- For the record, neither Steve Jobs nor Bill Gates have any brothers, although they each have two sisters.

Chapter 8: PageMaker, Ventura Publisher, and the DEST PC Scan Plus

Computer software giant Adobe recently made headlines with its proposed $20 billion acquisition of Figma, the developer of a popular web-based interface design application. According to Wikipedia, this is the 56th acquisition made by Adobe, Inc.–formerly Adobe Systems, Inc.–since 1990. It’s definitely been quite a ride since John Warnock started the company back in 1982 after leaving Xerox PARC to develop his *PostScript* printer language.

Warnock was previously a guest in a September 1985 *Computer Chronicles* episode covering laser printers. He made a return appearance in this next episode from October 1986 as the subject of a Wendy Woods report. Overall, this episode was the second in a two-part look at desktop publishing (DTP).

While the first part focused on the Macintosh, the emphasis this time was on the IBM PC and other MS-DOS compatibles. In the introduction, Stewart Cheifet showed Gary Kildall an issue of *PC Publishing*, a new magazine dedicated to desktop publishing on the IBM platform. Cheifet noted that over the past couple of years DTP had been considered the exclusive domain of the Apple Macintosh. Was it too late for the IBM guys to get into this? Kildall said he didn’t think so. DTP was a relatively new industry. He noted an IBM PC with an EGA card gave you real good graphics and there were new DTP applications coming out for both Digital Research’s GEM and Microsoft Windows, so he thought the market was now wide open.

Commercial Printers Adapted to New Age of DTP

Wendy Woods presented her first remote report from George Lithograph Company, a high-end printing firm in San Francisco. Woods said that the immense popularity of desktop publishing was a worrisome development for commercial printers, who saw it as a potentially grave threat. The time and cost saved by in-house printing of reports, training manuals, advertising brochures, or any other document was seductively appealing to organizations with large printing budgets.

Some commercial printers, heavily computerized themselves Woods noted, were striking back in novel ways. At George Lithograph, for example, the goal was to provide customers with an alternative to in-house publishing by bridging the electronic gap between desktop computer and professional printer. George provided its clients with a hardware-software package called *Automated Typesetting Process* (ATP Plus). The client worked through a standard, high-level word processor to compose text. A soft-touch keypad for typesetting commands was the only additional hardware. The keypad allowed the users to enter coded commands without producing visible codes in the document, making it easier to read. The customer could then send completed documents by telephone or mail to the printer, where the text was prepared for typesetting and graphics added.

Woods said that often forgotten in the heavily electronic world of DTP was the manual and mechanical aspects of printing–the specialized talents that created the artwork and the design of a document, and the massive machinery that printed the final product. Modern commercial printers like George hoped that their traditional customers would balk at making the investment in hardware and training that was required for in-house publishing. Instead, printers were adapting to the trend by integrating their systems with the new technology.

Aldus PageMaker, HP Laser Printer, and Microsoft Windows Formed Powerful Alliance

Paul Brainerd and Roger Archibald joined Cheifet and Kildall for the first of three studio round table segments. Brainerd, the founder and president of Aldus Corporation, briefly appeared at the end of the previous episode.

Archibald was a product marketing manager with Hewlett-Packard's printer division.

Kildall opened by asking Brainerd what you could actually do with a desktop publishing package like Aldus' *PageMaker*. Brainerd said it allowed you to use your personal computer to integrate text and graphics and put it together on a page and print it out on a laser printer. This gave you a high-quality result that could then be reproduced on an office copy machine or at your local print shop. Kildall clarified that DTP therefore took the place of mechanical typesetting. Brainerd said yes, it did.

Kildall asked about the types of customers who were buying DTP packages. Brainerd said his customer base was very broad. There were about 30,000 users of *PageMaker* in its first year. These users included corporations, individuals, artists–a very broad segment of business and nonprofit organizations.

Brainerd then provided a demonstration of *PageMaker* for the IBM PC. (This was apparently a Beta version, as the official release did not take place until December 1986, a couple of months after this episode aired.) Brainerd said the first thing worth noting was that the program used a graphical user interface, specifically Microsoft Windows, which allowed for the use of pull-down menus.

Brainerd created a new document, a 16-page newsletter. He showed how you could change the font and typeface, which he adjusted for the HP LaserJet printer in the studio. He then showed two pages side-by-side and added 2-column guides.

Brainerd explained that the key command in *PageMaker* was "Place," which meant placing text and graphics files. You could import text files from a word processor, such as *WordStart*, *MultiMate* or *Microsoft Word*, or even a scanned image. Brainerd placed an image of a stylized letter "A" and a text file created with *MultiMate* into the columns. He added that if the text were justified, the software would automatically hyphenate the text. Brainerd noted there were five different zoom levels so you could adjust the on-screen display to actual size.

Kildall asked if it were possible when editing the text to have it flow automatically throughout the entire document. Brainerd said yes, it would flow through the columns.

Kildall then turned to Archibald and asked him how important was the laser printer to DTP. Archibald said it was one of the key hardware elements, as it put in the hands of the PC user the ability to create high-quality output locally. He showed Kildall some examples of documents created with an HP laser printer, such as electronic forms that merged data, and a newsletter mixing different fonts with graphics.

Brainerd then showed his own sample documents. In addition to corporate documents, he noted many nonprofit organizations used *PageMaker* for creative work. He showed an issue of *Oak Square*, a short fiction quarterly produced in Massachusetts. Brainerd said he personally received a lot of satisfaction from seeing these types of documents.

Cheifet pointed out that Brainerd demonstrated *PageMaker* on a Hewlett-Packard Vectra, an IBM PC-AT compatible. Did you need an AT to run *PageMaker*? Brainerd said he would recommend it because *PageMaker* was an example of an application that pushed the boundaries. But you could use an PC XT with an enhancement to increase its speed.

Cheifet asked Archibald to explain the Document Description Language (DDL) used by HP for its laser printers and why the company picked that standard over Adobe's *PostScript*. Archibald said that HP studied numerous page description languages for two years and looked at the three major leaders. The company adopted DDL because it complemented the business segment that it was targeting, i.e., people working on larger documents in networked environments. DDL also complemented the printer command language that was currently in the HP LaserJet.

Cheifet noted that HP and Aldus were also involved in an alliance with Microsoft. What was that about? Archibald said it was primarily a marketing alliance. The goal was to promote Microsoft Windows, Aldus *PageMaker*, and HP's LaserJet and Vectra PC as a complete DTP package for the MS-DOS user.

Adobe Experienced Rapid Growth Thanks to PostScript

Wendy Woods returned to profile Adobe Systems and its founder, John Warnock. (This segment covered much of the same ground as Warnock's prior in-studio *Chronicles* appearance.) Woods said that the American entrepreneur's dream was to have the right product at the right time with all the right customers lined up. That was exactly what happened at Adobe Systems in January 1985 when Apple unveiled the LaserWriter printer.

Woods explained that Adobe wrote *PostScript*, the language that the laser printer understood and used to print out documents. By virtue of being out first, *PostScript* promised to become the industry standard. Warnock told Woods that *PostScript* had a good chance of succeeding in that goal. Clearly, there were a number of competing printer languages out there trying to catch up with *PostScript*, but Adobe had a good solid lead that he expected would grow over the next year.

After Apple employed *PostScript* in the LaserWriter, Woods said, other companies followed, including DEC, Wang, Texas Instruments, and Dataproducts, among others. She added that Adobe's growth was measured in its growth from two people in 1982 to over 80 today–and from zero income to $12 million a year. (For reference, Adobe today employs about 26,000 people and has annual revenues of nearly $16 billion.)

Woods noted that *PostScript* was now used in over 50,000 installed laser printers. And without those printers, there would be no DTP revolution. Warnock said *PostScript* had already made a fundamental impact on the way people did publishing and printing and that would continue to grow over the next several years.

PC Desktop Publishing with GEM

John Meyer and Richard Amen joined Cheifet and Kildall for the next studio segment. Meyer, who previously worked for Kildall at Digital

Research, was now president of Ventura Software, Inc. Amen was president of DEST Corporation.

Kildall opened by mentioning that Meyer was a major contributor to Digital Research's GEM project. (Indeed, he received a $25,000 bonus for his work, according to another former DRI employee, Lee Lorenzen.) Kildall asked Meyer how he differentiated his company's DTP package, *Ventura Publisher*, from the other products like *PageMaker*. Meyer said there were three distinctions. The first was speed. *Ventura* had the speed to run on an unmodified PC XT–and run very nicely on an AT. Second, there were built-in concepts that allowed a non-typesetter to get typographically correct results. Third, *Ventura* could do long documents like technical manuals as well as shorter documents like newsletters.

Kildall noted that one of the keys to DTP was adding pictures and drawings. With that awkward transition, he turned to Amen and asked about his company's product, the DEST PC Scan Plus, a scanner that could read documents into a PC. Amen said his company specialized in "input" for DTP packages and word processing programs. He demonstrated by placing a paper document into the DEST scanner. Cheifet clarified that the scanner was hooked up to a Compaq 286 under the desk. The scanner could then recognize text material on the page and translate it into ASCII text for the computer.

Kildall asked about the data rate on the scanner, i.e., how many words could it read per minute? Amen said the scanner was about 20 times faster than the fastest typist could type in the same amount of text. He noted the scanner took about 15 seconds to scan the sample page.

Kildall asked if the DEST scanner could handle any type of fonts. For example, could it read a Gothic font? Amen said his scanners were programmed to read the 16 most common fonts encountered in the office and that included a wide variety of fonts. Kildall asked about the number of text errors in a scanned document. Amen said that depended on the quality of the document that was put into the scanner. If it was smudged or wrinkled, that could present difficulties.

Kildall then asked about scanning pictures. Amen explained the DEST could scan drawings and photographs. He could then select a part of a page that he wanted to scan. He then inserted a sample photograph (of a DEST employee), which Amen noted would scan faster because there was less information to process. The scanned image could then be placed into DTP software like *Ventura*.

While Amen helped set up a *Ventura* demonstration, Cheifet asked Meyer if a user had the same DTP capabilities on a PC as they did on a Macintosh. Meyer said the capabilities were almost identical. The important thing was the type of software that you purchased. He emphasized that *Ventura* was designed for the general user rather than the specialist.

Kildall asked Meyer about the impact of DTP software on manual typesetting. Meyer said he believed that manual typesetting would be enhanced by software like *Ventura*. The smart operators would include DTP as part of their offerings, so that a customer that didn't just want to print their document on a laser printer would still have the option of using a professional print shop. Meyer then showed Cheifet a sample output of a document printed on a laser printer using *Ventura*.

Meyer next provided an actual demonstration of the *Ventura* software. He explained the use of stylesheets, allowing a user to select a block of text and turn it into a heading or subhead. He added a frame to an existing text page to show how the text automatically flowed around that frame. He then placed a picture of the space shuttle in the frame.

Meyer moved onto another sample document, a technical manual, which had a table of contents. He said *Ventura* could automatically generate the contents and an index. He also imported the photograph that Amen scanned earlier into a frame in another sample document, a book chapter.

Would Desktop Publishing Make Word Processing Obsolete?

Jonathan Seybold joined Cheifet, Kildall, and George Morrow for the final segment. Seybold was editor in chief of the *Seybold Report*, a desktop publishing industry newsletter.

Kildall asked Seybold if DTP software would eventually become word processing, eliminating the need for traditional character-based word processors. Seybold said that would probably happen in the long run. He said we'd likely to see a continuum product that covered a range of needs from doing simple memos to complex documents. So eventually the market would evolve into more complex text-and-graphic products. (Kildall quipped that eventually a home user could write a letter to Grandma and include a picture of the grandchildren.) Seybold said that DTP was really about taking what was a specialized skill that required specialized equipment and training and programming it into a computer so that everybody could use it. Morrow added this would also make people more computer-literate.

Cheifet asked Seybold why it took so long to get DTP into the MS-DOS environment relative to the Macintosh. Seybold said the Mac environment was really made for this sort of application. And that went back long before the Mac to work that was done at Xerox PARC in the 1970s, where they were actually doing desktop publishing. Now we were turning the MS-DOS machines into that kind of machine, because that was the natural sort of environment for DTP.

Cheifet asked Morrow if it took the laser printer to jumpstart the DTP market. Morrow said he thought it was. He said it was hardware that inspired software. And then software came along and dragged the hardware down into the marketplace. He cited the Apple II as an example. The Apple inspired the spreadsheet (*VisiCalc*), and then people started buying computers just to get spreadsheets.

Kildall said it was a combination of hi-resolution graphics with the laser printers that sparked the DTP market. Morrow retorted it was really the laser printer. After all, he didn't consider the Mac's display very hi-resolution. (And this is why we love George.) He added that the small, consumer-level copier with removable cartridges helped make it possible to do a low-cost laser printer like the LaserWriter, which then inspired DTP software. Seybold agreed. He added that when he saw the prototype of the LaserWriter, about nine months before its release, he went to Paul Brainerd and said, “This is what you ought to be working on,” and got him together with Apple.

AST Entered PC Business as AT&T Exited

Stewart Cheifet presented this week’s “Random Access,” which he recorded in October 1986.

- AT&T announced it would phase out the production and development of its personal computers. AT&T would now work exclusively with Olivetti, the company behind the AT&T PC 6300 and a major distributor of PCs in Europe. Cheifet said the announcement likely meant the end of the AT&T UNIX PC manufactured by Convergent Technologies. AT&T planned to shift focus towards helping its customers use a variety of computers to interface with the company’s telephone network.
- AST Research, Inc., which made PC expansion boards, introduced its first personal computer, the AT-compatible Premium 286, which ran at 10 Mhz and featured 1 MB “Fast RAM” card. Cheifet said AST was targeting its PC at the desktop publishing market.
- Hyundai planned to sell the new Blue Chip PC clone at discount retailers like Wal-Mart, Federated Department Stores (Macy’s), and Toys “R” Us. Cheifet said the base system would retail for $699, but a complete setup with a monitor, full memory, and a second floppy disk drive would run about $1,000.
- International Data Corporation projected computer industry growth of under 10 percent annually for the rest of the 1980s. IDC said the computer boom might return in the 1990s when applications using artificial intelligence created new markets for personal computers.
- A University of Colorado survey found “office automation” was a flop and that most executives felt computers had not increased productivity. Among the findings, researchers said that documents written on word processors were 27 percent longer than those written on typewriters–and documents composed on computers took 34 percent longer than those written out in longhand.
- Paul Schindler reviewed *The Idea Generator* (Experience in Software, Inc., $200), a decision support system. Schindler said the program

overcame the traditional steep learning curve of decision support systems "with a high degree of hand-holding."
- Microsoft released a new version of *Word* for the Macintosh, which now allowed users to move files from a Mac to a PC.
- IBM released a new computer laserdisc package called *PALS* (Principal of the Alphabet Literacy System) to help adults learn how to read. Cheifet said the system could be used to teach up to 16 students at a time.
- The publisher of a Cambridge, Massachusetts, software newsletter proposed annual awards for the best software documentation to motivate companies to improve their manuals.

Paul Brainerd's Journey to Inventing–and Later Abandoning–Desktop Publishing

Just a brief note before I begin my analysis. The Computer History Museum conducted a number of oral histories with guests from this episode, including a 2006 interview with Paul Brainerd by Suzanne Crocker; a 2017 interview with Jonathan Seybold by Burton Grad; and a 2017 panel including Brainerd, Seybold, Ventura Software co-founder Lee Lorenzen, and former Apple executive John Scull, which was moderated by Grad and David C. Brock. I'll be referencing these oral histories throughout the rest of the blog post.

Paul Brainerd grew up in Medford, Oregon, where his parents ran a photography studio. With that background, Brainerd later worked as a photojournalist for the student newspaper at the University of Oregon, which he entered in 1966. Brainerd eventually became editor of the *Oregon Daily Emerald*. He then attended graduate school at the University of Minnesota, earning a master's degree in journalism and working as editor of the *Minnesota Daily*.

Brainerd was also the production manager at both newspapers. While completing his master's thesis, he took a job as an assistant to the operations director at the *Minneapolis Star-Tribune*. He remained at the *Star-Tribune* until 1980. During that time, Brainerd helped convert the newspaper to computer typesetting and composition. The Minnesota paper was one of the first in the country to adopt a new minicomputer-based editing system developed by Massachusetts-based Atex.

In 1980, Atex offered Brainerd a position as its vice president for customer service. Realizing that he was still an operations assistant–and quite junior in terms of seniority–at the *Star-Tribune*, Brainerd said he jumped at the chance to move from journalism into the tech sector. So after briefly working out of Atex's Boston headquarters, he moved to Seattle to head up a new division charged with developing the next generation of text processing systems for microcomputers.

This project hit a wall in 1983. Eastman Kodak purchased Atex for 1.1 million shares in Kodak stock. Kodak decided to shut down Brainerd's Seattle operation and lay off all of the engineers working on the microcomputer project.

At this point, Brainerd decided to start his own company, which would develop a new microcomputer-based newspaper layout system from scratch. Using his proceeds from the sale of his Atex stock as a starting point, Brainerd raised $100,000 in startup capital. He brought in four of his fired Atex colleagues as co-founders and started Aldus Corporation in 1984, with a goal of building a prototype and raising additional funding within six months. (Aldus was named after Aldus Manutius the Elder, a 16th century Italian scholar and publisher.)

Brainerd said the six months–and the $100,000–were nearly gone when he finally found a backer in Vanguard Ventures, where one of the partners was former Apple sales director Gene Carter. This would be the first connection between Aldus and Apple. The second was Jonathan Seybold. As Seybold mentioned on *Chronicles*, he played a significant role in jump starting desktop publishing on the Macintosh, which debuted in January 1984.

Jonathan Seybold's father was John W. Seybold, who once served as executive director of the trade association representing the Philadelphia printing industry in labor negotiations. The elder Seybold later started ROCAPPI, which developed the first computer-based typesetting systems in the 1960s. After selling ROCAPPI in 1970, Seybold and son started the *Seybold Report*, a newsletter focusing on publishing technologies.

Jonathan Seybold later expanded the business into consulting and running a series of publishing conferences and seminars. Brainerd said he started attending these conferences while working at the *Star-Tribune*, acquainting him with Seybold. In early 1984, Seybold arranged for Brainerd to meet with two of his consulting clients–Apple and Adobe–where Brainerd learned about the forthcoming LaserWriter printer and *PostScript* language.

Brainerd decided then to pivot development of *PageMaker*, still in its pre-release form, to the Macintosh. Brainerd recalled he had a particularly uneasy exchange with Steve Jobs, still Apple's chairman at the time, who wanted him to price *PageMaker* at no more than $89.95. Brainerd "listened to him politely" and said nothing. *PageMaker* ultimately sold for $495, which Brainerd said was necessary to give Aldus sufficient cash flow to invest in growing its business.

Apple CEO John Sculley was desperate to turn around the sagging fortunes of the Macintosh and the LaserWriter. John Scull–not to be confused with John Sculley–was the marketing manager for Apple's business division. He recalled that sales of the LaserWriter had cratered from about 2,000 units sold during its first month on the market to about 400 per month by late 1985. Scull and Bruce Blumberg, who was in charge of the LaserWriter, decided that Apple had to back a page-layout program to help reinvigorate sales.

Scull said there were basically three options–the still-unreleased *PageMaker*, Manhattan Graphics Corporation's *Ready, Set, Go!*, and Boston Software Publishers' *MacPublisher*. Although *MacPublisher* had been the first layout software to market, Scull said it was not a WYSIWYG program, which meant it was a poor choice to showcase the Mac's capabilities. And while *Ready, Set, Go!*–which was featured in the previous *Chronicles* episode–was technically capable, Scull said it was "just too small a group" that lacked sufficient capital to pull it off in his view. That left Aldus, which was helped by the backing of former Apple executive Carter.

Meanwhile, Brainerd was holding discussions with his board members and investors in late 1984 over how to market *PageMaker*. According to Brainerd, one of the board members said they needed a "simple two-word explanation" to describe their product. Someone else said, "Could it be desktop-something?" Brainerd then came up with "desktop publishing" on the spot, and that stuck.

PageMaker 1.0 officially released in July 1985. Brainerd said he had abandoned his original plan to market the software primarily to daily newspapers after taking a trip down Interstate 5 from Seattle to his hometown of Medford, Oregon. During this trip, he spoke to a number of small-town newspapers, which all basically told him they were owned by corporate chains that made capital decisions over a one-to-two-year period. Brainerd then pivoted to focusing *PageMaker* sales to "small businesses, offices, churches, schools, [and] small publishers."

PageMaker quickly launched the Macintosh as a desktop publishing platform. Aldus went public in June 1987. At that point, Brainerd later observed, he was spending "less and less time doing the things I really enjoyed, which was talking to customers, understanding their needs, and working with the engineers to develop the products." He soon tired of running a public company and asked his board to start putting a succession plan into place.

Ultimately, that led to Brainerd selling the company. He decided to actively solicit a merger with John Warnock's Adobe. They announced a deal in March 1994. The two companies would merge in a stock-swap valued at $525 million. Warnock and Adobe President Chuck Gerschke would retain control of the combined company, which also kept the Adobe name. So it was in effect an Adobe absorption of Aldus.

The deal did hit one brief snag. Aldus had previously acquired the exclusive marketing rights to *FreeHand*, a vector graphics drawing program developed by Altsys Corporation. (Altsys also developed *Fontographer*, which I discussed in the previous post.) Altsys filed a lawsuit in April 1994 to stop the Aldus-Adobe merger, alleging the deal violated a non-compete clause in the *FreeHand* license. Basically, *FreeHand* competed with

Adobe’s *Illustrator*, and Altsys believed the new Adobe would bury the former to protect the latter.

United States antitrust officials expressed similar concerns. So to make everyone happy, Aldus agreed to grant the rights to *FreeHand* back to Altsys. This allowed the Adobe-Aldus merger to close in September 1994. Less than two months later, Altsys turned around and sold itself to Macromedia. In a final ironic twist, Adobe acquired Macromedia in 2005, which buried *FreeHand* once and for all. (To be fair, Macromedia ceased active development in 2003.)

From Warnock’s perspective, the Aldus acquisition was about one thing–killing off competition from *QuarkXPress*. While it didn’t arrive on the market until 1987, *QuarkXPress* would eventually overtake *PageMaker* in the 1990s to become the dominant page layout software. Adobe didn’t have its own high-end page layout system at the time and Warnock and Geschke realized they didn’t have two or three years to develop their own product. By acquiring *PageMaker*, that bought them time to develop what would eventually become its successor product, *Adobe InDesign*, which debuted in 1999. By that point the market for *PageMaker* was largely dead, and Adobe quietly stopped development after releasing a final version in 2001.

As for Paul Brainerd, he remained on the combined Adobe board for a time but otherwise made a clean break with the tech industry. Brainerd spent the next 25 years pursuing charity work. In 1995, he started the Brainerd Foundation, which made grants to over 500 environmental protection organizations in the Pacific Northwest. In 2008, Brainerd announced he planned to spend the Foundation’s entire endowment during his lifetime and sunset its work by 2020. The Foundation met its goal and formally closed at the end of 2020. Brainerd’s other major post-Aldus project was founding Social Venture Partners, a nonprofit network of philanthropists, which is still in operation today.

Ventura Went from DRI Spin-Off to Forgotten Corel Add-In

The brief history of Ventura Software offers an interesting contrast to the Aldus story. While Paul Brainerd was a publishing industry veteran looking to build a company and serve thousands of customers, John Meyer and his co-founders at Ventura were ex-Digital Research employees fresh off the GEM project who created a product with one customer and eventually sold the company when there was pressure to do more.

Meyer's co-founders, former *Chronicles* guest Lee Lorenzen and Don Heiskel, were the actual programmers behind *Ventura Publisher*. Lorenzen worked at Xerox fresh out of college and later followed his manager to DRI to work on CP/M. Lorenzen specialized in user interfaces and helped develop the GEM desktop and its associated applications. Heiskel was Lorenzen's boss in DRI's graphics group.

Lorenzen said the concept that became *Ventura* started out as an idea at DRI to build a high-end word processor that could handle graphics. (As he noted, the term "desktop publishing" didn't exist yet.) DRI President John Rawley wasn't interested in the idea, so Lorenzen and Heiskel decided to leave and start their own company. The departure was on friendly terms, as Lorenzen and Heiskel licensed the rights to use the GEM user interface as part of their still-undeveloped application.

Lorenzen and Heiskel recruited Meyer to join them. According to a 1983 DRI company newsletter, Meyer came to the company earlier that year from Sykes Datatronics, where he had been a product marketing director. DRI initially hired Meyer to manage its hardware group, although by the time he left in 1984 he'd been elevated to director of marketing for the company.

Meyer has an engineering degree from Stanford and a Harvard MBA, which likely made him an attractive candidate to serve as Lorenzen and Heiskel's "front man" for the newly formed Ventura Software, Inc., which incorporated on October 8, 1985, less than two months after the three co-founders handed in their resignations to DRI. Eric Bender reported for *Computerworld* that Ventura planned to "develop and market computer-aided publishing software" targeting "several niches, the first being users who already own desktop laser printers."

As Lorenzen later explained, he and his colleagues had given themselves a tight deadline to actually produce a working prototype–just six weeks. They wanted to have their program ready for the November 1985 COMDEX show in Las Vegas. Lorenzen said they built their product on top of GEM, not just because they were familiar with the software and could easily get a license from DRI, but also because it was the most efficient use of limited PC resources for their graphics-intensive application:

> We had very little memory to work with. We didn't want to run it on [Microsoft] Windows because it didn't really work that well at that time. Windows 1.0 was not really usable, and 325 KB out of 640 KB was just to get Windows in it. Then you had to build your app on top of that. That was not going to work.

Lorenzen said he managed to build a GEM runtime that only required 24 KB of RAM. This allowed him and Heiskel to complete their working prototype by their self-imposed COMDEX deadline. Meyer demonstrated *Publisher* to several companies–notably Xerox, Eastman Kodak, and MicroPro (the publisher of *WordStar*)–at a suite at the Riviera hotel during the conference.

Ventura never planned to sell *Publisher* to consumers directly. Instead, Meyer's goal at COMDEX was to identify a potential customer that could serve as the sole distributor. Lorenzen said it ultimately came down to Kodak and Xerox, and Xerox won. He said Xerox signed a deal a couple of weeks after COMDEX that paid Ventura a $5 million per year non-refundable advance against royalties–upon delivery of the product, of course. Xerox and Ventura publicly announced the deal in April 1986.

Ventura Publisher initially retailed for $895. The full title, at least according to ads from this period, was *Xerox Desktop Publishing Series: Ventura Publisher Edition*. The name "Ventura" was actually a second choice. Lorenzen said they originally wanted to call their company and program "Ventana," after the Spanish word for "window." But ventana was taken so they chose another Spanish word in *ventura*, which meant "good fortune." Early reviews were largely favorable. Michael J. Miller, writing for *InfoWorld*, said *Ventura*'s features were impressive but "what's even more surprising is its speed." He noted that he ran the program on a PC-AT with an EGA card and “the program kept up with me quite nicely.” Another reviewer, Ted Silveira, wrote for *PROFILES* magazine that *Ventura* was a “complex program” but “very intuitive to use” and noted it was “very responsive” on his Kaypro PC running at 8 MHz.

However, Silveira also flagged a few issues. First, he said that if the user wanted to make any changes to their hardware configuration–such as adding a new graphics card or printer–they had to reinstall *Ventura* completely from its 11 5.25-inch floppy disks. There was also no “undo” command and the program could not make use of expanded or extended memory. It was also quite a hard disk-hog for the time, requiring up to 3 MB of space depending on the necessary printer drivers. Nevertheless, Silveira said *Ventura* was a “wonderful program” and quite polished for a first release.

Meyer and the Ventura team did quickly put out a 1.1 release sometime around June 1987, which existing users could purchase as a $100 upgrade. A full 2.0 release followed in the fall of 1988. The biggest new feature in *Ventura Publisher 2.0* was support for creating tables inside of documents. Stephen Jones of *Computerworld* noted in a September 1988 report that *Ventura* was now considered the market leader in DOS-based desktop publishing applications, keeping even Aldus *PageMaker* at bay. Meyer told Jones that Ventura had shipped a total of 200,000 copies of the 1.1 version in 1987.

With the 2.0 release came Ventura Software’s only two other products, which were essentially *Ventura* expansion packs. The first was *Professional Extension*, which cost $595 and added expanded memory support and several other features. The second product was *Network Server*, which cost a whopping $1,295 and enabled multi-user support for concurrently working on documents over a local area network. In April 1989, Xerox announced a “3-Pak Net Workstation,” which bundled three copies of *Ventura* with *Network Server* for just $995.

Beyond these expansions, Xerox also pushed Meyer and company to port *Ventura* to other platforms, notably Microsoft Windows and Presentation Manager, the graphical interface for IBM’s OS/2 operating system. Xerox announced an OS/2 version at the April 1989 COMDEX show in Chicago.

But as 1989 dragged on, so too did the relationship between Ventura and Xerox. Rachel Parker, writing for *InfoWorld* in October 1989, reported that Xerox decided to spin-off the unit responsible for marketing *Ventura Publisher* into its own standalone business, dubbed Xerox Desktop Software. Larry Gerhardt, an industry veteran "with no background in consumer software," came in to run the new subsidiary.

Gerhardt bluntly told Parker, "The relationship with Ventura was not alive," and that the existing contract–the one that guaranteed $5 million a year in upfront royalties–"did not provide incentives for Ventura to bring new products to the market." Meyer was publicly supportive of Gerhardt's leadership, stating "he has tremendous focus." But Craig Cline of the *Seybold Report* told Parker that it might be too late for Xerox to do anything more with *Ventura Publisher*: "The challenge Xerox has always had is that if any other company had the Ventura product, they would have made a success of it."

But the reality was that Ventura remained a small software development house content to produce its sole cash cow. According to Lorenzen, the company never expanded beyond five employees. In addition to the three co-founders there was a fourth ex-DRI engineer who wrote the printer drivers and an office manager. The three engineers kept the software updated while Meyer wrote all of the documentation in addition to serving as CEO.

Lorenzen later recalled that after the 1989 COMDEX show, Meyer tried to convince his partners that they should hire more people and build a bigger software company. Heiskel was vehemently opposed. Lorenzen said that he wasn't eager to spend the next several years "mediating between these two very strong individuals." Fortunately, he said someone at Xerox–I assume he meant Gerhardt–offered to buy them out.

In March 1990, Xerox formally acquired the *Ventura Publisher* source code and associated intellectual property rights for $18 million. Ventura Software itself did not immediately fold. Instead, the company renamed itself DLJ Software, Inc.–reflecting the first initials of the three co-founders–and Meyer, Lorenzen, et al., continued to finish up work on *Ventura Publisher 3.0* for GEM, Windows, and OS/2. (A separate team hired by Xerox did a

Macintosh version.) After completing that work, DLJ Software quietly dissolved on October 22, 1990.

Xerox Desktop Software subsequently renamed itself Ventura Software, Inc., and moved its 180-person operation into a 57,000 square-foot facility in San Diego. In 1991, The new Ventura introduced *Ventura DataBase Publisher*, a program that could be used to format and extract information to and from a database. That same year nu-Ventura released *Ventura Publisher 4.0*.

But Xerox didn't seem to have the heart to keep going in the consumer software business, especially as *Microsoft Word* and other word processing programs had started to match legacy DTP packages like *Ventura* in features–and surpassed them in terms of ease-of-use. In August 1993, Xerox sold its rights to *Ventura Publisher*, *Ventura DataBase Publisher*, and all other related technologies to Ottawa, Ontario-based Corel Corporation for approximately $10 million. The second Ventura Software folded soon thereafter as it no longer had any products to sell. At the time of the sale John Meyer, described in the *Ottawa Citizen* as a "consultant near San Jose," said the combination of Corel and *Ventura Publisher* was a "marriage made in heaven." (There's not much in terms of public statements from Meyer after this second sale of Ventura, and as far as I know he's retired and still living in Monterey, California, today.)

At the very least, *Ventura* seemed to be getting out of a bad marriage. *InfoWorld* reported in October 1993 that *Ventura Publisher* had "suffered greatly" since the Xerox acquisition and the product–now on version 4.1.1–could no longer "compete against either QuarkXPress or PageMaker when it comes to today's high-end needs." The core product was still the same after five years, *InfoWorld* noted, and recent enhancements and added features failed to "fix that basic problem."

Corel did quickly release its first version of *Ventura*–now called *Corel Ventura 4.2*–in late 1993. This was likely the last release based on the original source code developed by Lorenzen and Heiskel. The following year, *Corel Ventura 5.0* came out with substantial changes to the interface and structure. Corel skipped to a 7.0 when it released the first 32-bit version of *Publisher* for Windows 95 and Windows NT in 1997. By this point the program came as part of a $995 double-CD-ROM package that included a suite of applications including *WordPerfect*, the venerable word processor acquired by Corel from Novell in 1996.

Corel continued to push updates to *Corel Ventura* until 2002, which marked the final 10.0 release of the product. Corel subsequently merged what was left of *Ventura* into its own flagship *CorelDRAW Graphics Suite*, which is still available today. Ironically, the *Ottawa Citizen* suggested in 1993 that the original *CorelDRAW* was itself an unofficial spin-off of the original *Ventura Publisher*. Apparently, Corel's developers started out by adding drawing features to *Publisher*, which led to them creating *CorelDRAW* as a standalone product.

Notes from the Random Access File

- This episode is available at the Internet Archive and has an original broadcast date of October 23, 1986.
- Roger Archibald had a long career with Hewlett-Packard, joining the company sometime in the late 1970s. He left in 1998 to join StorageTek for three years, but returned to HP in 2000 as vice president and general manager of its storage software division. Archibald left HP for good in August 2003 and worked for Colorado-based COPAN Systems for five years before briefly running his own company, GaggleSoft, and retiring in the early 2010s.
- I didn't learn much about the DEST Corporation. The original company was apparently started sometime in the late 1970s and went bankrupt in 1989. Several former DEST managers (backed by venture capital) then formed the New DEST Corporation, which carried on the original company's desktop scanner business until that company's dissolution in 1999. Richard Amen went on to run two other companies. Indicast and APX, in the 1990s, before transitioning into the real estate business in the 2000s.
- Like most people involved in computer publishing during the 1980s, Jonathan Seybold eventually sold his *Seybold Report* to Ziff-Davis in 1990. Much like Michael Tchong from the previous episode, Seybold said he clashed with Ziff's management and he left the company after his contract expired in 1995. Seybold then co-founded PGP Inc. with

Phil Zimmerman, the author of the Pretty Good Privacy encryption protocol, which is still in use today, although the company only lasted a couple of years. Seybold later retired to Santa Fe, New Mexico, where he was involved in an unsuccessful effort to save the College of Santa Fe.

- George Lithograph started in 1925. It managed to adapt to the computer desktop publishing market quite well and by the 1990s was still one of the largest commercial printers in northern California, reporting annual sales of around $42 million. In 1999, Connecticut-based Printing Arts America (PAA) acquired George as part of a venture capital-backed buying spree of regional commercial printers. As it turned out, acquiring 11 companies via debt just prior to the early 2000s recession was not a savvy business strategy. PAA entered bankruptcy in 2002, which led to the closing and liquidation of George Lithograph, according to *Printing Impressions*.
- *The Idea Generator* was developed and published by Experience in Software, Inc., a company started in 1983 by Roy Nierenberg, a former attorney with the U.S. federal government. Niernberg authored all of the programs published by his company, which remained in business until 2019.

Chapter 9: 101 Macros for Lotus 1-2-3 and Unnamed Lotus Symphony Adventure Game

If you've ever watched retro-tech YouTube videos, you might get the impression that the most widely used computer programming language of the 1980s was BASIC. While it's true that BASIC was how most elementary and secondary school students learned the "basics" of programming, in practice you didn't see a lot of commercial software developed in the language. Nor was BASIC something that was likely to be used day-to-day in a business.

Indeed, if there was a single most popular business programming language of the late 1980s, it was possible macros for *Lotus 1-2-3*. The spreadsheet program was at the height of its dominance during this period. And given the original DOS releases of *1-2-3* relied entirely on a keyboard- and menu-driven interface, macros were essential to avoid repeatedly typing the same sequences of commands over and over.

This next *Computer Chronicles* episode from November 1986 offered a "guide to macros," not just for *1-2-3* but similar programs of the day. Stewart Cheifet's cold open was from a local bookstore that displayed a shelf filled with books dedicated to the subject of computer macros. In the studio, Cheifet showed Gary Kildall one of those books, *Simpson's 1-2-3 Macro Library*, which was authored by one of the guests on today's program. Cheifet said there were about 75 macros in the book, ranging from a complete menu-driven database system to a macro to help you write other macros. A lot of people thought of macros as just a series of commands in one keystroke, he noted, but in fact macros had become a form of programming language.

Kildall said that was because macros came from programming languages. He said that in the early days of assembly language it took 50 or 100 instructions to do even the simplest things. So what a programmer would do was put just one name on that sequence of instructions. So every time the assembler saw that name, out came the instructions. In that sense, macros were kind of like a subroutine in the way it looked, but they were much different than a subroutine because they expanded each time you saw the word. What's happened with application programs was that now a user could add additional structures and commands to the basic program.

Ceramics Studio Used Macros to Manage Payroll

Susan Chase narrated the first remote segment for this episode featuring Evans Ceramics Gallery in Healdsburg, California. Chase said that a pottery operation specializing in the Japanese raku technique seemed like the last place most people would expect to find computers. But Evans was such a place thanks to its bookkeeper, Leslie Arey. (I'm not sure of the spelling on this name, as it was not displayed on screen.)

Chase said that Evans employed 25 people and shipped roughly $100,000 in fine ceramics each month, which required a lot of bookkeeping. Arey said she handled all of the company's disbursements, accounts payable, vendor lists, payroll, invoicing, and order entry with the computer. As the company had grown, she didn't think they could have kept their staff to where it was without the computer.

Arey noted that when she started with Evans, she knew nothing about computers except how to turn them on. But then she read the manuals and learned that all she had to do was type in what she wanted the computer to do, hit the right keystrokes, and it would execute all of those keystrokes.

Chase said the process of doing the payroll alone used to take a day. But the macros that Arey programmed into the *Enable* integrated software package used by Evans allowed her to complete the payroll in just two hours. Arey programmed a macro for any task that took more than five keystrokes. And her work had made automation of the payroll so simple that new office workers could learn the system easily.

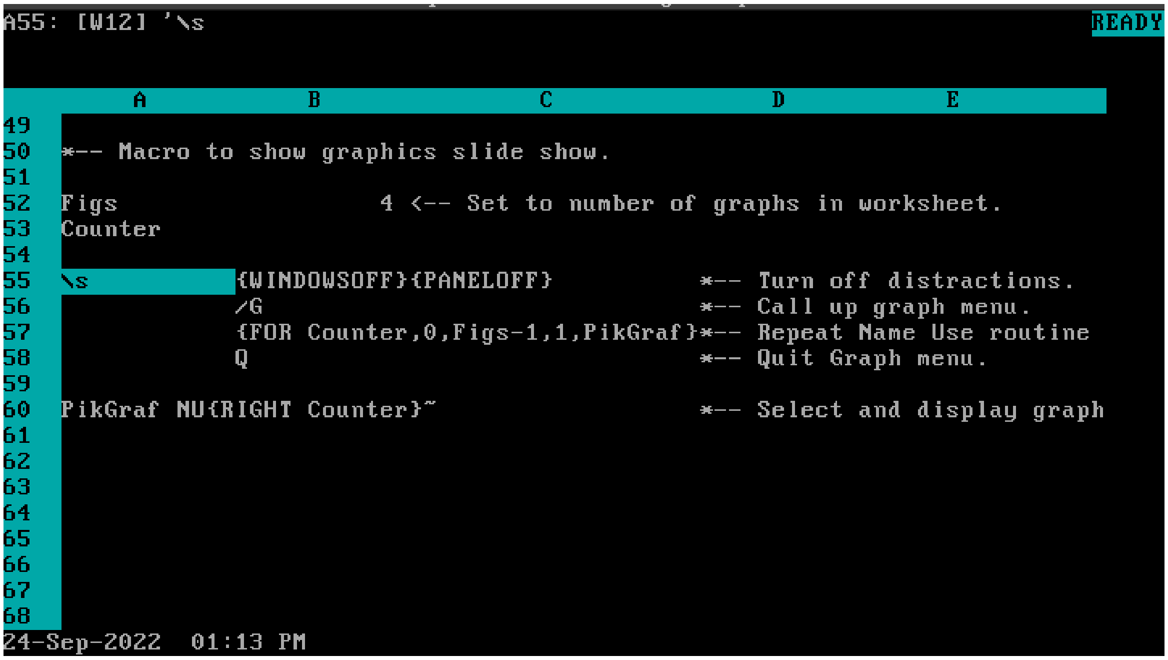
What Were Macros All About?

Alan Simpson and Lynne Hughes joined Cheifet and Kildall for the first studio round table. Simpson was the author of the aforementioned *Simpson's 1-2-3 Macro Library*. Hughes was a financial analyst with Tymnet, a data communications network based in Cupertino, California, and a subsidiary of McDonnell Douglas Corporation.

Kildall noted that Simpson was both an author and teacher of computer programs. He asked Simpson to “teach us what macros are all about.” Simpson said a macro was designed to save you some keystrokes. For example, you might need to regularly type the time and date into a spreadsheet. By making a macro, you could type a single key that would fill in the current time and the current day. He then demonstrated this in *Lotus 1-2-3*.

Simpson explained that you could also use macros to extend the built-in capabilities of *1-2-3*. For example, *1-2-3* had no way of displaying the day of the week for a particular date. But by creating a macro, you could just have it put in a formula that figured that out.

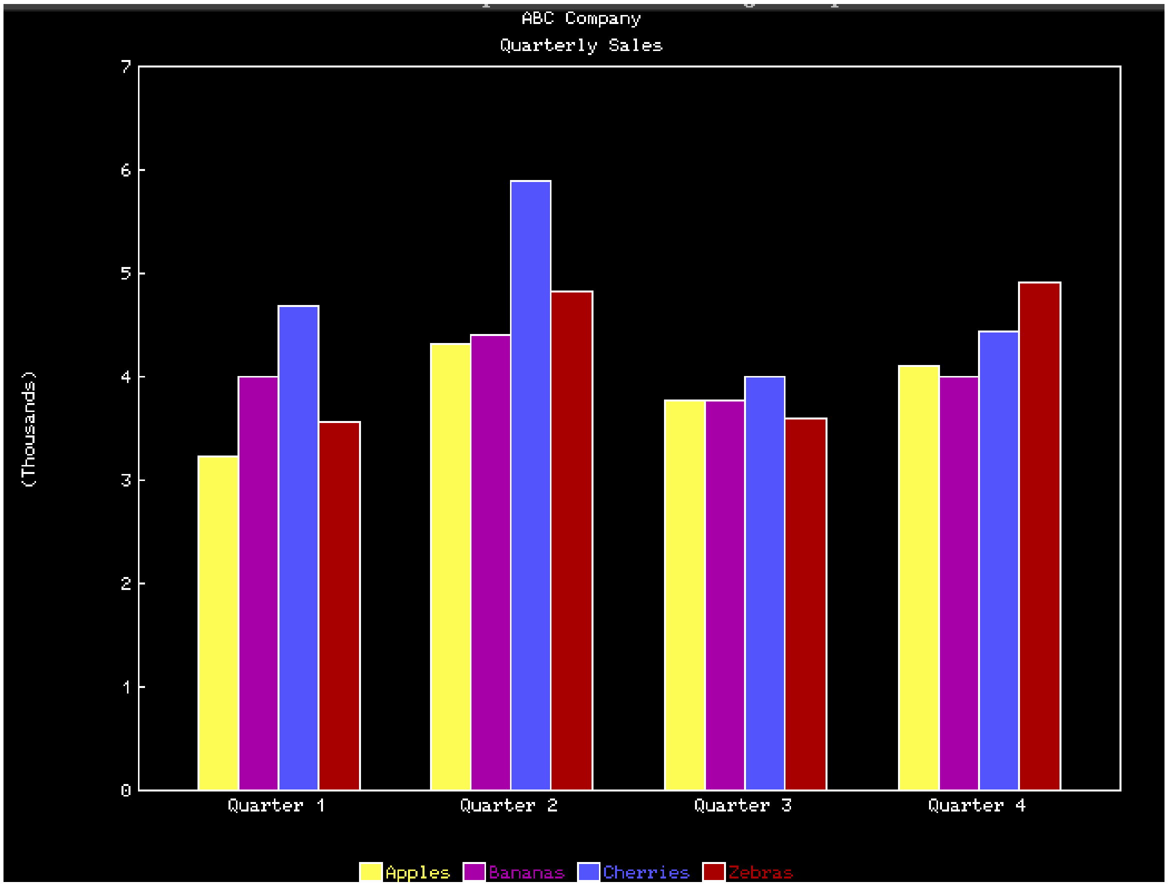
As another example, Simpson said that *1-2-3* could do slides. But this required the user to select a number of menu options to go from one slide to the next. By creating a macro, you could create a slideshow to cycle through a spreadsheet and a series of graphs just by pressing a single keystroke. Simpson then demonstrated this with the following series of slides. (This is a re-creation I made using version 2.2 of *Lotus 1-2-3* for DOS, which was slightly newer than the version that Simpson used.)



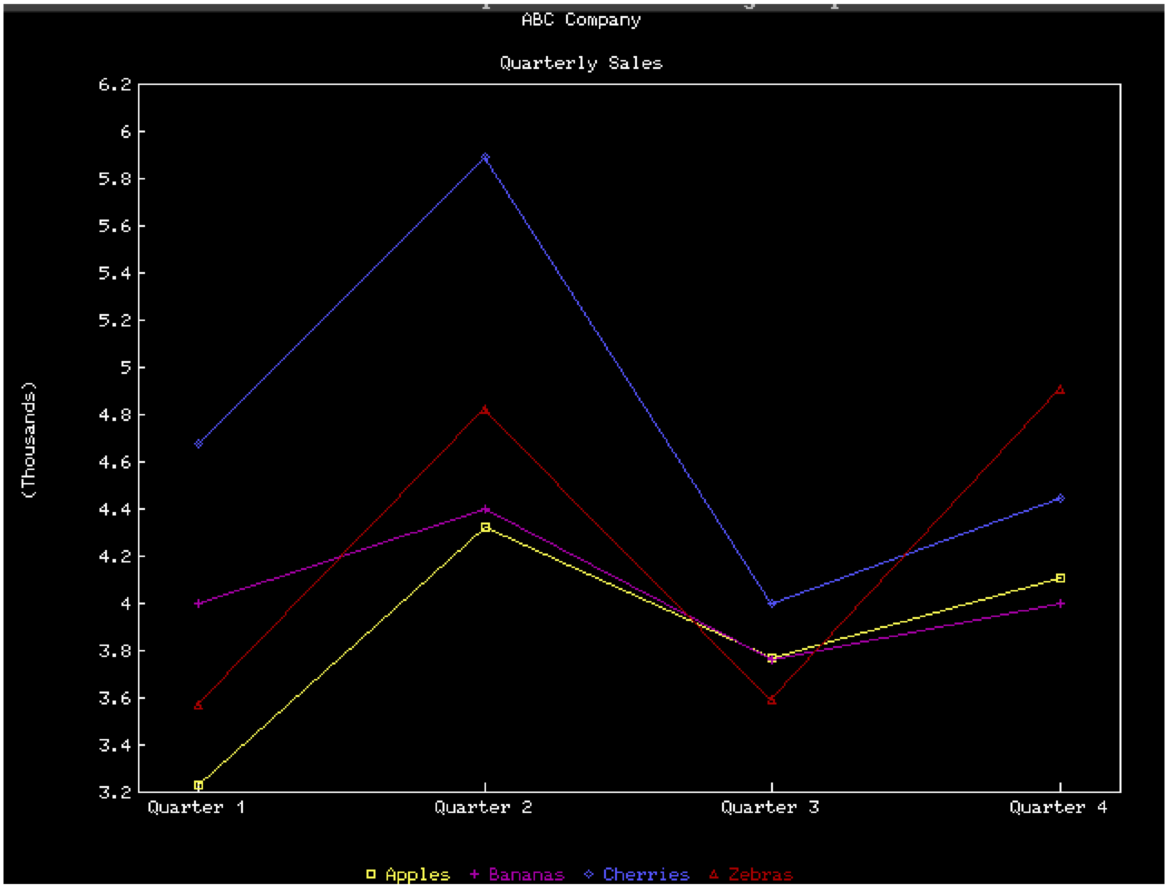
```
A55: [W12] '\s                                                             READY


         A           B               C               D           E
49
50  *-- Macro to show graphics slide show.
51
52  Figs                  4 <-- Set to number of graphs in worksheet.
53  Counter
54
55  \s          {WINDOWSOFF}{PANELOFF}          *-- Turn off distractions.
56              /G                              *-- Call up graph menu.
57              {FOR Counter,0,Figs-1,1,PikGraf}*-- Repeat Name Use routine
58              Q                               *-- Quit Graph menu.
59
60  PikGraf NU{RIGHT Counter}~                  *-- Select and display graph
61
62
63
64
65
66
67
68
24-Sep-2022  01:13 PM
```

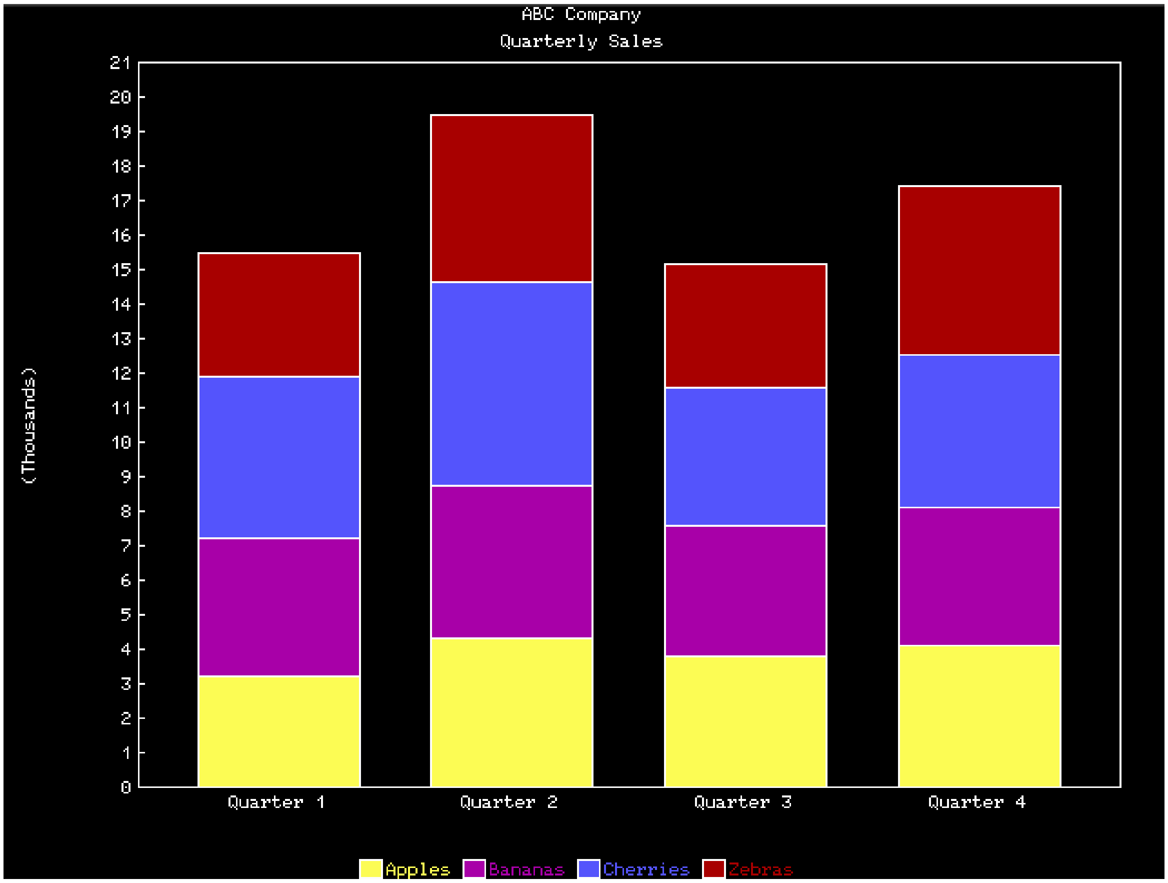
A Lotus 1-2-3 worksheet showing a complex macro to display a series of slides. The macro is assigned to the Alt-S key combination.



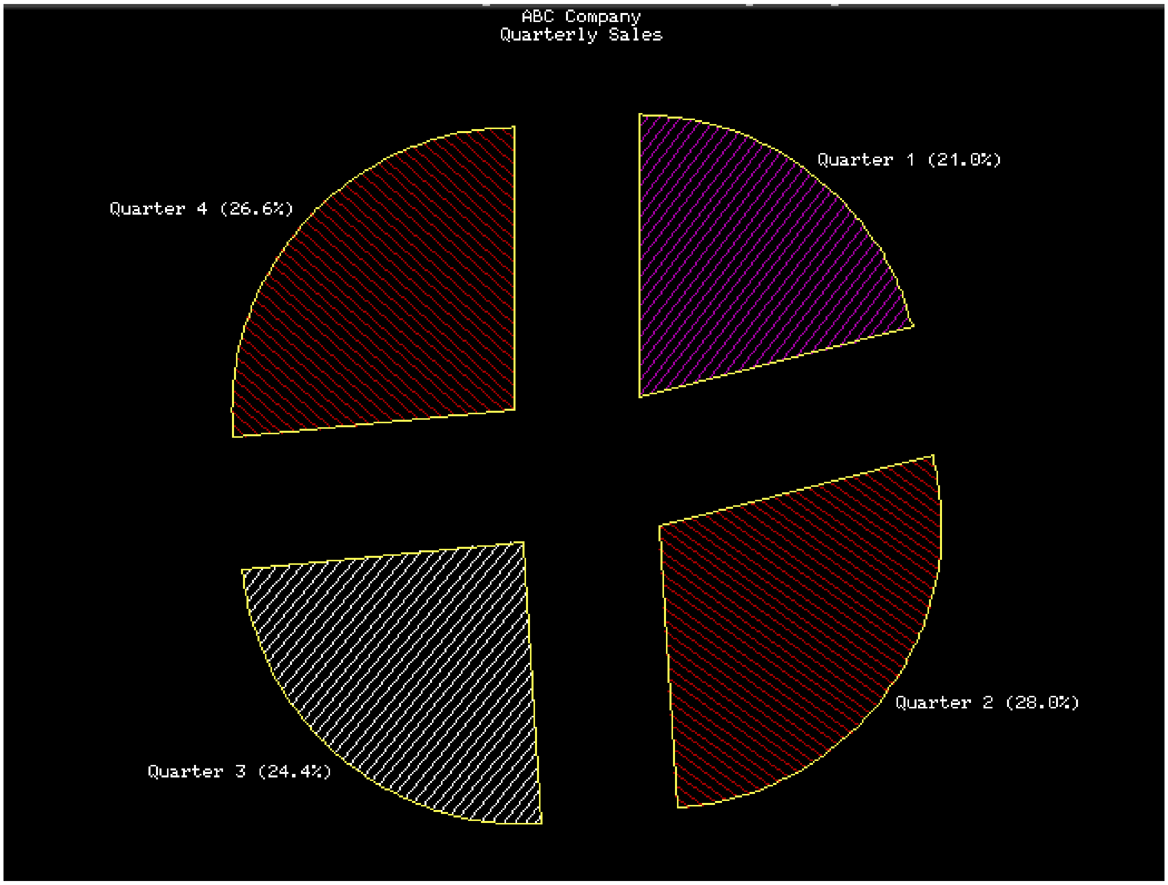
A bar graph showing the quarterly sales for four different product lines of a fictional company.



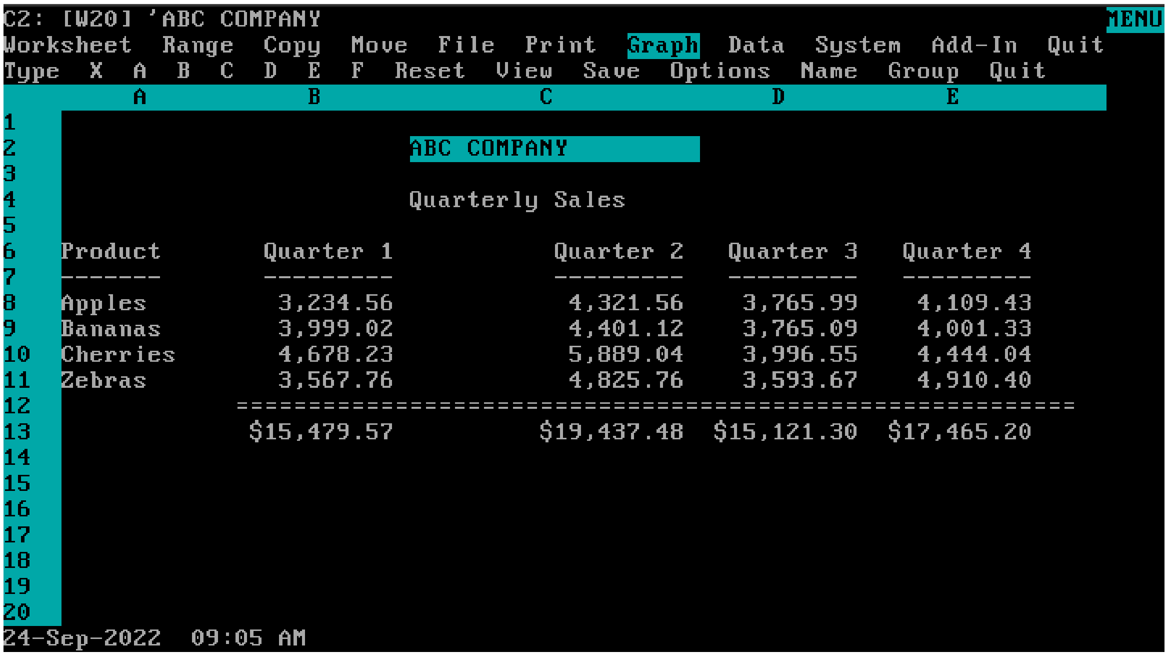
A line graph showing the quarterly sales for four different product lines of a fictional company.



A stacked bar graph showing the quarterly sales for four different product lines of a fictional company.



A pie chart graph showing the quarterly sales for four different product lines of a fictional company. Each segment of the pie is separated.



```
C2: [W20] 'ABC COMPANY                                                 MENU
Worksheet  Range  Copy  Move  File  Print  Graph  Data  System  Add-In  Quit
Type   X  A  B  C  D  E  F  Reset  View  Save  Options  Name  Group  Quit
          A           B               C               D           E
1
2                           ABC COMPANY
3
4                           Quarterly Sales
5
6   Product       Quarter 1           Quarter 2   Quarter 3   Quarter 4
7   --------      ---------           ---------   ---------   ---------
8   Apples         3,234.56            4,321.56    3,765.99    4,109.43
9   Bananas        3,999.02            4,401.12    3,765.09    4,001.33
10  Cherries       4,678.23            5,889.04    3,996.55    4,444.04
11  Zebras         3,567.76            4,825.76    3,593.67    4,910.40
12              ==========================================================
13              $15,479.57          $19,437.48  $15,121.30  $17,465.20
14
15
16
17
18
19
20
24-Sep-2022  09:05 AM
```

A Lotus 1-2-3 worksheet showing the quarterly sales figures for a fictional company.

Cheifet asked Simpson how many keystrokes this saved. Simpson said for this example, maybe 50 or 60 keys. Simpson noted this made macros especially helpful for users who were not experienced with *1-2-3*.

Simpson then demonstrated how you could develop customized menu-driven systems using *1-2-3* macros. He showed a sample system that could manage a database. There was a custom menu that replaced the original *1-2-3* menus and allowed the user to perform such functions as adding a new entry to the database, sort entries, prepare mailing labels, or save any current work. This enabled the user to operate the database without knowing any of the underlying *1-2-3* commands, which Simpson said saved hundreds of keystrokes.

Kildall asked Simpson what the "body" of the macro looked like. Simpson said the database macro was fairly large, so it was more complicated than most. But he showed the basic structure. Cheifet observed that what Simpson had done was build an entirely new application with *1-2-3*.

Cheifet then turned to Hughes, whom he described as a "normal user of computers" and asked how she wrote a complex macro with hundreds of lines to help with her job. Hughes explained that she worked with a "very large budget structure" for her company's 1987 operating plan. The company's structure was so complex that there was an enormous bulk of information. So she set up a database to handle the profit and loss statements. This required defining a worksheet to either enter information into the database or to print off a report to browse the information. If she had to do a separate worksheet for each of the company's 125 departments, it would take hours. So the macro that she wrote formatted the worksheet for her so she could either enter new information into the database or print off information as needed.

Hughes provided a brief demo of her macro, which was written in *VP-Planner*, a program similar to *1-2-3* published by Adam Osborne's Paperback Software International. She showed the entry worksheet, which had a prompt at the bottom to enter the number of a department. The macro would then format a worksheet based on the number entered. The macro prompted for the number of months involved. Anything less than 12 months would then lead to a choice of quarters. The formatted worksheet could then be used to create a department budget for the specified period.

Kildall noted that Hughes learned to program this macro by herself without any help. Hughes said it came down to trial and error. Kildall asked Hughes if she would recommend other people try to do macros themselves. Hughes said absolutely, especially given the time savings.

Kildall said that in the past, macros had performed slow relative to traditionally compiled software code. He asked Simpson if that was still the case. Simpson said it depended. Macros were still slower than programming in C or Pascal, but if you compared it to the time of typing out of commands, macros were much faster. Cheifet asked Hughes how much time she had saved now that she'd written her macro. Hughes said it saved her about 50 percent of her average work day.

Excel Broke New Ground for Macros on the Mac

Susan Chase presented a second remote segment, narrating some B-roll footage of ComputerWare, a Macintosh retailer based in Palo Alto, California. Chase said that within a different operating environment like the Macintosh, macros had a new significance, both in the kind of applications and with respect to the machine's ease of use. At this ComputerWare store, for instance, a Macintosh users group took advantage of the Mac's special interface by exploring a range of macros to use within a popular spreadsheet program–Microsoft's *Excel*.

Chase said that ComputerWare manager Nicholas DePaul used *Excel* to organize his staff's day-to-day schedule. He set up a spreadsheet with a macro that established column and row sizes, headings, and formats. He had substantially reduced the number of keystrokes required to calculate a trend and translated the information into a graph. And when he needed to put an entry into bold or italic script, he could do so with 75 percent fewer keystrokes.

The special natures of macros on the Mac became obvious when you wanted to create one, Chase said, using *Excel*'s "learn" mode. You just picked out the attributes from the various menus, started the recorder function, and watched the code appear in plain English as you entered each keystroke.

Chase said that macros were meant to take some of the chore out of maneuvering through a program. Why should creating a macro be a chore as well? Although macros had been growing in popularity as more users discovered the advantages–consolidating commands, simplifying keystrokes, and reducing repetition–the full potential had yet to be realized.

Lotus Symphony as a Game Engine?

E. Michael Lunsford and Daniel Gasteiger joined Cheifet and Kildall for the final studio segment. Lunsford was the president of Macropac International, which published a program called *101 Macros for Lotus 1-2-3*. Gasteiger was an editor with Lotus Publishing Corporation, a subsidiary of Lotus Development Corporation that published *Lotus* magazine.

Kildall opened by noting that Lunsford made a business out of selling macros. What exactly was he selling? Lunsford explained that *101 Macros* was a software package that came with a manual. He provided a demonstration of a macro that created a new column in a spreadsheet. He also showed a macro that automatically inserted an apostrophe before entering a combination of numbers and text. (*1-2-3* required an apostrophe before entering a label including text.) Another macro gave the user a choice of where to go after executing a copy-and-paste function. By default, *1-2-3* returned the user to the cell that was copied, but Lunsford's macro enabled the user to remain at the pasted cell.

Kildall asked Lunsford if he had a lot of customers for *101 Macros*. Lunsford said sales had been very good. He then demonstrated a few more macros, including one that let the user set different home locations (i.e., bookmarks) within a spreadsheet, which made it easier to return to frequently visited cells.

Kildall asked Lunsford if he had any concern about selling the underlying "source code" for his macros as it were. Kildall noted this had previously been an issue with programmers who developed applications in BASIC. Lunsford said his macros were part of a "completely open architecture." The user could modify and learn from the macros.

Cheifet asked about another macro that Lunsford wrote that let the user do word processing inside of *1-2-3*. Lunsford said it was called "My Blank Memo." It produced a blank memo template and automatically formatted the entered text into paragraphs. Cheifet asked how a user would actually get a macro from *101 Macros* into their spreadsheet. Lunsford said you would highlight a blank area of your spreadsheet and select the File Combine option from the *1-2-3* menu and add the range of cells for the macro you wish to import (`/FCCN` was the sequence of keystrokes.)

Cheifet then turned to Gasteiger, who worked with *Lotus Symphony*, an integrated office suite that included a word processor and a database. What was the added power you could get out of macros in that bigger universe? Gasteiger said working in an integrated environment gave you just about everything you needed at your disposal for your daily work. He cited communications as an example. *Symphony* could download information from a mainframe or another source. When you dropped a macro on top of that, the user could parse the downloaded information into a form usable by the spreadsheet. Kildall asked Gasteiger to demonstrate a report-generation macro he'd developed in *Symphony*. Specifically, he showed how a macro could import names and addresses from a database into a form that made it easy to print address labels.

Kildall then noted that Gasteiger was actually working on an adventure game developed with *Symphony* macros. Gasteiger said he saw the integrated environment as an ideal place to keep track of all of the different variables involved in creating an adventure game. He showed the opening screen of the game, a *Symphony* worksheet window with the following introductory text:

> You are traveling in a small passenger plane over mainland China in the year 1926. You have been dozing for the past hour or so when a change in attitude of the aircraft causes you to waken.
>
> Looking around, you notice that all the other passengers have vanished, as has the plane's pilot-presumably, through the open door to your left. You also noticed that the plane is tilted nose-downward and you're descending at an alarming rate.
>
> Taking stock of the situation, you see that something must have exploded in the cockpit as some of the controls are intact. In fact the only things in the entire chain of the plane that don't look damages are your seat cushion, your briefcase, and a backpack stored under your seat…"

There was then another window prompting the user, "What do you do?" and a third window enabling the user to enter their response.

Cheifet asked what the advantage was of writing a game in *Symphony* macros. Gasteiger quipped the advantage was he had *Symphony*. He said that most of the tools that you needed to make the game were already in the integrated package. If you were using a traditional programming language like BASIC or C, you'd have to create those basic tools as well as the game. So by using *Symphony*, most of the work was already done for you.

Japanese Companies Teamed Up to Break U.S. 32-Bit Chip Monopoly

Stewart Cheifet presented this week's "Random Access," which was recorded in November 1986.

- The Fall COMDEX show opened in Las Vegas. Cheifet said there were approximately 1,300 exhibitors, and the highlights included a new batch of Intel 386-based computers, low-cost laser printers, desktop publishing software, low-cost PC clones, and a new 5.25-inch disk drive that held 10 MB disks. (A future *Chronicles* episode focused more in-depth on this COMDEX show.)
- Fujitsu and Hitachi announced a joint venture to develop a 32-bit computer chip following the refusal of American companies to license their designs to Japanese manufacturers. Cheifet noted that Fujitsu recently announced plans to buy 80 percent of American chip maker Fairchild Semiconductor, and the Japanese company already owned 49 percent of supercomputer manufacturer Amdahl Corporation.
- Ashton-Tate, Lotus Development Corporation, and Microsoft were trading at or near their all-time highs on the stock market thanks to analysts predicting strong fourth-quarter results.
- Former Lotus CEO Mitch Kapor was now studying artificial intelligence as a graduate student at MIT. (Kapor never completed his degree.)
- A new report from Cornell University said there was a shortage of PhDs in computer science and engineering, noting that only 400 such degrees were awarded each year to fill more than 1,200 jobs, with salaries ranging up to $100,000.
- Paul Schindler reviewed *Scriptor* (Screenplay Systems, Inc., $300), a tool for converting text files into formatted scripts for the television and movie industry. Schindler noted that about 2,000 professional screenwriters currently used *Scriptor* to produce about 70 percent of all television scripts.
- The Wall Street Journal reported that Northeastern Software, a major mail-order software house, had filed for bankruptcy following numerous complaints from people who never received their purchases.
- IBM and Carnegie Mellon University unveiled their plans for creating the "most networked campus in the country." Cheifet said that the cabling of the CMU campus was now complete, with the goal of networking 10,000 PCs by the end of 1989. IBM and CMU were also involved in a joint venture to develop artificial intelligence applications for PCs.

- A Stanford University study found that top executives were using computers about seven hours per week–much more than previously thought–and 93 percent were using PCs rather than terminals.
- A new computer game based on *The Rocky Horror Picture Show* was now available for the Commodore 64.

Daniel J. Gasteiger (1959 - 2017)

Daniel Gasteiger died on June 1, 2017. Gasteiger was born and raised in Ithaca, New York, the home to Cornell University, which he also attended. After graduating from Cornell in 1983 he joined the Massachusetts-based Lotus Publishing Corporation.

Gasteiger worked as an editor and columnist at the monthly *Lotus* magazine for many years. He also served as principal author for *The Macro Book: Expert Advice for 1-2-3 and Symphony Users*. A few months after his *Chronicles* appearance, in May 1987, Gasteiger married Stacy Pierce, a fellow Lotus employee who worked in market research.

Gasteiger left Lotus in 1989 to become a freelance writer, editor, and consultant. He continued to write articles for *Lotus* into the early 1990s, as well as other popular computer magazines like *Byte* and *PC World*. Gasteiger also developed *The 1-2-3 for Widows Report* for Lotus Publishing and in 1992 formed a company with Nicholas Delonas to publish a newsletter called *Spreadsheet Consultant*.

In 1994, Gasteiger and his family moved from the Boston area to Lewisburg, Pennsylvania. He formed a new consulting business, Gasteiger & Associates, and spent the next four years leading the development of “Pisces,” an IBM system used to estimate the costs for bidding on consulting contracts. Gasteiger & Associates also worked on spreadsheet applications for Lotus, Procter & Gamble, ITT Sheraton Corporation, and the Harvard Institute for International Development.

During the 2000s, Gasteiger supplemented his ongoing tech consulting with writing about gardening and transitioning from urban to rural living. He started the blogs *Your Small Kitchen Garden* and *Cityslipper* in 2008. In 2011, Cool Springs Press published his book *Yes, You Can! And Freeze and Dry It, Too: The Modern Step-By-Step Guide to Preserving Food*.

Gasteiger also wrote a regular gardening and food column for *The Daily Item*, a newspaper based in Sunbury, Pennsylvania. Sadly, the focus of his column shifted in early 2016 when he received a diagnosis of what turned out to be untreatable pancreatic cancer. Gasteiger went on to write 39 columns for *The Daily Item* detailing his struggles with the fatal disease, with the last column published less than a month before his death.

I could not find any additional information about the unnamed adventure game that Gasteiger demonstrated on *Chronicles*. It certainly was never released as a commercial product. As far as I know, the single screenshot that Gasteiger showed during his *Chronicles* appearance is the only surviving proof of the game's existence.

Notes from the Random Access File

- This episode is available at the Internet Archive and has an original broadcast date of November 11, 1986. Based on Alan Simpson's on-air demo, the studio portions of the program taped on Saturday, November 1, 1986, around 1:30 p.m. (*Chronicles* normally taped two episodes every other Saturday during this period.)
- Stewart Cheifet introduced Wendy Woods as the presenter of the first remote segment, even though Susan Chase narrated. My guess is that this mix-up was due to the fact that Woods had a baby in August 1986, and she probably went on leave before recording the narration for the remote segments in this episode, leaving Chase to substitute. Chase also substituted occasionally for Stewart Cheifet on "Random Access."
- Alan Simpson has continued to work consistently as a computer book author and instructor. He's most recently been affiliated with ed2go, teaching web development courses in CSS, HTML, and Javascript.
- E. Michael Lunsford continued to write computer books into the 1990s. During the 1990s and 2000s, he worked in product development and marketing for a number of companies, such as Palm Inc., EverNote, Sony America, and July Systems. In recent years he's moved into the world of children's fiction, authoring a series of novels targeted at middle school readers. He also wrote a play, *Scary, Scary Night*, a Halloween comedy that he later turned into a musical.
- Evans Ceramics Gallery later changed its name to Evans Designs, Inc. The company dissolved in 2007.
- The Fujitsu purchase of Fairchild Semiconductor never happened. The *Los Angeles Times* reported in March 1987 that strong opposition within the

Reagan administration–notably from Commerce Secretary Malcolm Baldrige and Defense Secretary Caspar Weinberger–scuttled the deal. Schlumberger Limited, the French company that owned Fairchild, reached a deal later in 1987 to sell its subsidiary to National Semiconductor.

- The company behind *Scriptor* is still in business. Stephen Greenfield and Chris Huntley started Screenplay Systems, Inc., in March 1982 and released the first version of *Scriptor* in January 1983, according to their website. As Paul Schindler's review noted, by 1986 the program had already emerged as an industry standard. For their work, the Academy of Motion Picture Arts and Sciences awarded Greenfield and Huntley an Oscar for Technical Achievement in 1994. Their company, now known as Write Brothers Inc., currently publishes the successor to *Scriptor–Movie Magic Screenwriter*–and several other script-writing utilities.

Chapter 10: Prodex, Note-It, Referee, Ringmaster, and In-Synch

Operating systems like the original MS-DOS were not capable of multitasking–they could only run one program at a time. But you could fake multitasking by taking advantage of the “terminate and stay resident” (TSR) system call in DOS. Essentially, a program that used this call was not cleared from RAM when a new program loaded and remained available to the system until the next reboot.

Such “RAM resident software” was the subject of this next *Computer Chronicles* episode from November 1986. Stewart Cheifet opened the program by telling Gary Kildall that when Borland first released *Sidekick*, it was a big deal that you could pop-up a simple calculator on your screen using a RAM resident program. Cheifet then showed a physical calculator–an HP-12C financial calculator–and noted there was now a computer version of the device, which was also available as a TSR program.

Cheifet said the problem with these types of programs was that they kept “bumping into each other” in memory. Why did that happen? Kildall explained that “terminate and stay resident” was an internal programming function within DOS. When it was first invented, he didn’t think anyone knew what it would actually be used for. But a program like *Sidekick* basically intercepted information coming in from the keyboard. If it was for *Sidekick*, that program would process it. Otherwise, *Sidekick* threw the information “over its shoulder” to DOS or another program. The problem was that when multiple programs tried to use the same keyboard information they could end up conflicting or overwriting one another.

Juggling RAM Manually to Mimic Multi-Tasking

Wendy Woods presented her first remote segment, which profiled author Bob Cowart, who wrote articles and books about using computers, such as

The ABC's of dBase III Plus. Woods said that in order to meet his deadlines and keep up to date with the latest information, Cowart found a way to keep several programs loaded simultaneously in his computer's RAM.

Cowart explained that he basically divided up the system RAM into three partitions, which all ran DOS independently. It wasn't a multitasking system as only one program was active at any one time. Woods said that for his latest *dBase III* book, Cowart wanted access to *WordStar*, *dBase III*, and a screen capture program all at once. He managed to juggle all three, but it wasn't easy. Cowart said it was like cooking–if you didn't do the recipe in the right order, things wouldn't work out. And he only found a workable order of loading the programs through experimentation. The first step was deciding which keys you wanted to control each program and if you could redefine them in a way that was workable and convenient.

Woods said this process required the user to have a good memory and some sense of organization. Programs must be loaded in a certain order–and assigning the same keys to different functions could lead to disaster. But if you were careful, manipulating your computer's live memory could lead to some impressive, tangible results.

Adding Notes to Lotus 1-2-3

Dale Leatherman and David Whitney joined Cheifet and Kildall for the first studio round table. Leatherman was president of Prodex Development, which produced a TSR program also called *Prodex*. David Whitney was a developer with Access Learning Technology Corporation, which developed *Note-It* for Symantec's Turner Hall subsidiary.

Kildall reiterated that the idea behind a TSR program was that it "stayed behind the scenes" and could be called back up by the user as needed. For example, *Note-It* worked in the background as a utility for *Lotus 1-2-3*. Whitney provided a demonstration. He started by entering a command at the DOS prompt to start *Note-It* before *1-2-3*. (Cheifet pointed out this meant that *1-2-3* was actually running resident inside of *Note-It*.) Whitney emphasized this approach was practical when dealing with a TSR program that only needed to run with one particular application, as *Note-It* wouldn't take up memory when running a different program, such as a word processor.

Whitney loaded a sample *1-2-3* worksheet, a financial statement for a fictional lemonade stand. He explained the purpose of *Note-It* was to attach little notes to individual cell locations within the worksheet. He pressed a series of three keys to highlight the cells on the sample worksheet that currently had attached notes. He then pulled up a note on one of the cells. This "woke up" *Note-It* and suspended *1-2-3* within the computer's memory. The *Note-It* interface itself worked just like any other word processor. You could also press a key to "lift" the note off the screen for a moment to look at the underlying worksheet as you typed.

Whitney added that one of the special features of *Note-It* was that if you moved a cell attached to a note, that note would follow to the cell's new location. He also demonstrated a command to search for a particular text string (up to 32 characters) within all of the notes in a document. This enabled the user to create a "text dimension" for documenting the spreadsheet.

Cheifet then asked Leatherman about his company's product, *Prodex*, which Leatherman had characterized as a "second-generation" TSR program. What did he mean by that? Leatherman said the first generation included "pop up" tools like calculators and simple calendars. He felt that wasn't good enough for business professionals. They needed tools that matched the way they worked. This was the target market for *Prodex*.

Leatherman provided a demonstration. Leatherman set up a hypothetical scenario where Kildall had just called him on the phone. Leatherman then pulled up a record of his notes of previous calls with Kildall. He hit a key in *Prodex* to bring up a telephone directory. Hitting `K` pulled up a list of names that started with that letter, including Kildall. Leatherman then hit `F10` to bring up a command menu with a series of choices (similar to *1-2-3*) that led him to a folder with various notes of his prior conversations.

Kildall asked if you could actually dial a phone from *Prodex*. Leatherman said you could. Leatherman did a mock demo of that function, which was called up by pressing `F9`. He then showed another list of notes involving a different contact. Leatherman emphasized this would help a business person “clear their desk” of paper and provide instant access to information. Leatherman said you could also log a call by pressing `F8` at the beginning or ending of the call.

AST Surged on Sales of Multi-Function RAM Boards

Wendy Woods presented her second remote segment, this time focusing on AST Research, Inc., in Irvine, California. Woods said that to run more TSR programs, you needed more memory. And over one million users now used AST’s Six Pack Plus expansion cards, which provided extra RAM combined with a clock, calendar, extra ports, and enhanced graphics for the PC. Woods said that AST was doing so well that it not only weathered the computer industry’s recent slump but had actually doubled its income over the past year.

AST’s Tony Paradiso told Woods that a lot of it came down to market timing. He noted that even now, IBM still did not provide a multi-function card like the Six Pack Plus. Indeed, AST was one of the first companies to provide that level of multiple functionality in a card that only took up a single expansion slot.

Woods said the recent appeal of AST’s RAM boards had to do with multitasking, i.e., the ability to run several programs at once, such as a word processor with a spelling checker. AST bundled *DESQview*, an operating environment that acted like a “traffic cop,” with its cards. This made it easier for a computer to switch between programs. And even as AST diversified into other types of products, the RAM cards still accounted for 40 percent of its business.

The Problem of TSR Conflicts

Robert Luhn, an associate editor at *PC World* magazine, joined Cheifet and Kildall for the next studio segment. Cheifet said Luhn was there to demonstrate the problems that can arise when different TSR programs started “bumping into” one another. Luhn said there were a number of symptoms that could arise with TSR programs. Some of them were minor. One of the first things that could happen was that a program simply stopped dead and waited for some sort of keyboard input, which he demonstrated.

Luhn pulled up *WordStar* on the demo computer. He said there were actually three or four programs now loaded into memory. This was common, he noted, as most users couldn’t solve all of their problems with just one TSR program. Kildall asked if the order in which a user loaded the programs mattered. Luhn said it certainly could make a difference. One of the first pieces of advice he gave to someone running several programs was that changing the loading order could sometimes change the results.

Luhn then called two TSR programs on top of *WordStar*, causing the system to freeze. He then tried to pull up a third program and received an error beep. He then tried calling the programs up in a different order, but that didn’t work either. The programs simply couldn’t agree on how to do things, especially since they each wanted to capture the same keystrokes. Kildall asked if this problem came down to a lack of standards. Luhn said the issue was that software developers had to follow too many standards. There were multiple types of hardware to support and DOS itself changed every couple of years.

Another typical problem for users, Luhn said, was programs like *WordStar* and *dBase* had a “run” utility to execute programs within those applications. But you couldn’t run TSR programs with these utilities. For example, he tried to execute *Sidekick* using the *1-2-3* run command and nothing happened. (Well, the machine froze.)

Kildall asked if the move towards graphical user interfaces would help resolve these problems. Luhn said that most of the TSR programs were designed for character-based interfaces. So if you tried to pull up these programs inside a GUI it would still lead to system conflicts. This would be an especially big problem for people who wanted to use TSR programs like *Sidekick* inside of something like *Microsoft Windows*. But as adoption of GUIs became more common, that would likely make TSR programs redundant and unnecessary.

How Could You Resolve TSR Conflicts?

For the final segment, Richard Kraus and Chip Rabinowitz joined Cheifet and Kildall. Kraus was director of product development with Persoft, Inc., which developed *Referee*. Rabinowitz was the director of engineering for New York-based American Video Teleconferencing Corporation (AVTC).

Kildall asked Kraus about *Referee* and how it could reduce conflict between TSR programs. Kraus set up a demonstration involving a TSR program and a word processing application called *XyWrite*. He said there was a particular conflict with a prior version of *XyWrite*, which that program's developers resolved by coming out with their own utility called *XyKeybaord*. That program was supposed to make it easier to run TSR programs with *XyWrite*. But it turned out that *XyKeyboard* didn't work with a specific TSR program from Borland called *Superkey*. The result was that every keystroke the user made appeared twice on the screen.

Kraus explained that *Referee* allowed the user to control TSR programs. The user could see the order in which each program loaded and how much memory it used. It even allowed you to unload a particular TSR program and free up its memory. He rebooted the computer and loaded a portion of *Referee* that watched him load the same programs as before. This time, loading both *XyWrite* and *Superkey* did not produce the double-keystroke problem. He explained that *Referee* resolved the issue by temporarily disabling or deactivating loaded TSR programs. This prevented the disabled program from interfering with the other programs in memory. While *Referee* did this in the background without any user input, Kraus showed there was a menu that allowed the user to control the software directly and see what programs were loaded and active.

Cheifet then turned to Rabinowitz and asked how his project, *Ringmaster*, proposed to address this same TSR conflict problem. Rabinowitz said that *Ringmaster* was a series of standards for TSR developers to follow. It wasn't so much a different solution than *Referee* but actually worked hand-in-hand with it. (He noted that several *Referee* developers also contributed to the *Ringmaster* project.)

Cheifet asked how *Ringmaster* specifically addressed the problem. Rabinowitz said the main reason for the problem is that every program loaded was watching the keyboard at the same time. With the *Ringmaster* standard, that program would watch the keyboard alone, and when another program wanted the input, *Ringmaster* would pass it on. The developers of TSR programs would obviously have to make their software work with this protocol.

Cheifet noted that Rabinowitz was one of the first developers to put together a product using the *Ringmaster* standard. He asked for a demonstration of that product, *In-Synch*. Rabinowitz said *In-Synch* was "desktop teleconferencing" software. It was a TSR program that allowed multiple users to work on the same *Lotus 1-2-3* spreadsheet at the same time remotely. In a demonstration, Rabinowitz and a colleague in New York both edited the same *1-2-3* worksheet at the same time.

Everything's Coming Up 386 at COMDEX

Stewart Cheifet presented this week's "Random Access," which was recorded in November 1986.

- IBM reported that it sold more PCs in September 1986 than in any previous month in its history.
- One investment firm upped its projections for the growth of annual PC sales from 20 to 25 percent.
- The fall COMDEX show recently ended in Las Vegas. Cheifet said the highlight of the was the Intel 80386, with six vendors showing off new machines that took advantage of the microprocessor.
- In other COMDEX news, IBM reported "healthy" sales of its PC Convertible laptop, saying it could not keep up with demand. Cheifet said Toshiba reported similar demand for its portables.
- NEC announced its own new portable, the MultiSpeed, which the company claimed was the fastest laptop on the market, capable of running at 9.5 Mhz.
- China unveiled its own PC-AT compatible at COMDEX, the Great Wall PC, and an XT compatible retailing for $686.

- Epson announced a printer-scanner hybrid that allowed the user to put a scanner cartridge in place of the traditional printer ink ribbon.
- Paul Schindler reviewed *IQ Test* (Rational Designs, $40), a not-exactly-scientific intelligence test.
- Xerox announced PC Typewrite, a hardware-based spell checker that beeped at users when they misspelled a word. (This product was featured in a later *Chronicles* episode.)
- MasterSoft announced *Word for Word*, a program that converted text and formatting commands between different word processing programs.
- Xerox announced a $5 million grant to create a new center for learning methods in Palo Alto, California, which would focus on creating AI-based systems for adult literacy and job training.
- NASA's Marshall Space Flight Center unveiled a new astronaut module for future space flights, featuring 18 talking on-board computers known as "George," which would help diagnose repairs. (The Marshall Center is named for Gen. George C. Marshall.)

An Early Precursor of Google Docs?

I don't have much to say about the programs that appeared in this episode. The need for RAM resident software largely disappeared after the release of Windows 95. Indeed, preemptive multitasking was already well on its way to mass adoption in later 1980s releases of MS-DOS and competitors like Digital Research's Concurrent DOS.

But in 1986, TSR programs–and programs to manage TSR programs–were still in high demand. John Walkenbach, reviewing *Referee* for *InfoWorld* in August 1986, gave that $70 program top marks, noting that it was "well worth the price" if you had to run two or more TSR programs at once, as he didn't experienced a single system crash. He added, however, that *Referee* was incompatible with existing multitasking environments like *Windows*, *GEM*, and *DESQview*.

Prodex also received qualified praise from reviewer Michael J. Miller in an August 1987 *InfoWorld* column. Miller described the $90 *Prodex* as "rather single-minded" but "actually very sophisticated" when it came to managing a telephone directory and logging calls.

But perhaps the most intriguing demo from this episode was *In-Synch*, a program that seemed to offer an early form of simultaneous multi-user file editing that is now commonplace with services like Google Docs. As M. David Stone explained in a March 1987 review for *PC Magazine*, while there were other programs on the market that let one user send information from their application to a user on a second computer, *In-Synch* actually made it possible to run "the same program on both computers simultaneously, sending the keystrokes in both directions." Stone said the software worked remarkably fast–there was no "noticeable delay" when connecting two using a 2400-baud modem–but he did run into problems with the machines frequently falling out of sync due to overrunning the keyboard buffer. That said, he praised *In-Synch* for its primary intended use of assembling and performing slide-show presentations remotely. (American Video Teleconferencing Corporation, which published the program, was as the name suggested a business that designed and installed video conferencing facilities.)

Notes from the Random Access File

- This episode is available at the Internet Archive and has an original broadcast date of November 18, 1986.
- Bob Cowart's first job in the tech industry was as a service technician with North Star Computers, an early manufacturer of CP/M microcomputers. He parlayed that experience into writing a column for Stan Politi's *Computer Currents* and working as a consultant specializing in *dBase*. This in turn led to him writing his first computer book about *dBase*. Cowart went on to write more than 40 computer books. In recent years, Cowart has maintained a personal blog detailing his diagnoses with Lyme Disease and Parkinson's Disease.
- David Whitney co-founded Access Learning Technology Corporation in 1983. The company had a short lifespan and was no longer in business by early 1988.
- Robert Luhn had a long career as an editor and writer. He served as editor in chief at the aforementioned *Computer Currents* from 1994 to

2000. During the 2000s he was executive editor for O’Reilly Media’s consumer book group and later spent a decade as director of communications for the National Center for Science Education.

- Richard Kraus remained with Persoft until 1991. Since then he’s worked primarily in management consulting.
- Former AST Research executive Tony Paradiso currently serves as CEO of E3 Go Green, a solar energy startup based in Maine.
- Chip Rabinowitz led a committee of programmers that developed *Ringmaster* as what was described at the time as a “public domain” standard for resolving conflicts among TSR programs. (Today this would likely be an open source project.) Although early reports in the tech press suggested that *Ringmaster* would soon emerge as a “de facto standard,” I couldn’t find any information about the protocol’s ultimate fate.
- Surprisingly, Hewlett-Packard still sells the HP-12C calculator that Stewart Cheifet demonstrated during the studio introduction. The calculator, first produced in 1981, is HP’s longest-selling product.

Chapter 11: COMDEX/FALL ’86

The first Computer Dealers Exhibition was held in 1979 in the ballroom of the original MGM Grand hotel in Las Vegas, Nevada. (That hotel is now known as Bally’s.) According to a 2021 retrospective by Bob McGlincy for *Exhibit City News*, that first show drew 167 exhibitors and roughly 3,900 attendees. Subsequent exhibitions–known by the abbreviated name of COMDEX–would draw substantially greater interest from the growing personal computer industry and its customers.

For instance, the fall 1986 COMDEX show–now held at the Las Vegas Convention Center–drew about 1,200 exhibitors and 80,000 attendees. By this point COMDEX had outgrown its original function as a dealer-based show. It was now *the* place for many tech companies to announce their latest products to the media and the public.

Computer Chronicles would become a regular visitor to the fall COMDEX show starting with the November 1986 edition. This was actually not the first COMDEX event covered by the program. A May 1985 episode looked at the first-ever COMDEX show held in Japan. Indeed, as COMDEX grew in popularity it added more shows and locations to its schedule. In 1986 alone there were seven COMDEX shows held around the world, with Las Vegas serving as the season finale.

Stewart Cheifet and Gary Kildall opened this episode from the floor of the Las Vegas Convention Center during COMDEX. Cheifet noted that critics were saying computer shows were not as big or important as they used to be. But Kildall was there in his capacity as CEO of Digital Research. Why did he come to COMDEX? Kildall said it was a chance to “see and be seen.” You could not only make contact with customers but also see what the competition was doing and possibly get some new ideas for products. For example, at least year’s COMDEX the emphasis was on windowing systems like *GEM* and Microsoft’s *Windows*. But this year it was more about applications to run with windowing systems, such as desktop publishing.

It’s All About the 386s!

Cheifet opened the next segment standing in front of the Compaq booth, which featured a giant mockup of the company’s new DeskPro 386 PC. He said the big story of COMDEX–in more ways than one–was the Intel 80386 microprocessor and the new generation of PCs it had spawned. Compaq was first out of the game with a 386 machine, but it was obvious at COMDEX that it had a lot of company.

In narration, Cheifet said that at first glance, it looked like the next step of the IBM cloning game from PC to AT was the 386, and almost everyone wanted to be included. But this time, IBM was not in the picture, and it was hard to tell just who was cloning whom. Along with Zenith, Compaq, and Kaypro, other companies were offering their own 386 versions, and they were betting on a big price advantage.

Asian Manufacturers Entered the Clone Wars

Cheifet said that Multitech Electronics, Taiwan’s largest computer manufacturer, unveiled a typical 386 model but at a budget price: $3,995, about $2,000 cheaper than most. (Multitech is better known today as Acer.) Multitech demonstrated the processing power of the 386 at its booth by running an engineering design program on a 16-Mhz, 32-bit 386 chip, which was two to three times faster than 16-bit AT computers. The Multitech’s base 386 system came with 1 MB of RAM on the main board, a 40 MB hard disk, and IBM-compatible expansion slots.

The excitement surrounding the 386 could turn to gloom for AT owners, Cheifet said, who appeared to be facing an expensive new upgrade. But Intel–the source of the 386 chip–was offering an alternative solution known as the Inboard 386. Richard Bader, an Intel representative, said the Inboard would let an AT user upgrade their system by adding a 386 processor and effectively create a whole new machine.

Cheifet said that the introduction of the 386 almost raised the desktop micro almost to the level of a minicomputer. But it also raised other issues like software compatibility and obsolescence. Bader replied that the way that

Intel designed its family of microprocessors, everything that ran on the original IBM PC would also run on a 386 machine. Of course, Intel couldn’t promise that everything designed for the 386 would run on that first PC, but that was progress. A lot of the new software would require the new machines. But the “real investment” customers had made in their older machines would not be wasted.

On a more basic level of PC cloning, Cheifet said, South Korean manufacturers were showing XT and AT substitutes at some very attractive prices. Samsung Electronics, which produced everything from semiconductors to CRT monitors, introduced an XT clone (the SPC-3000E) with a retail price under $800. Samsung’s AT clone (the MD-1252Y) would sell for less than $2,000.

Meanwhile, computers competed for space with cars at the Hyundai booth, with that company’s successful venture into the automobile market serving as a symbol of its future computer plans. Cheifet said that Hyundai planned to sell its own Blue Chip line of IBM compatibles through discount stores and mass merchandisers. Hyundai executive C.S. Park said the company had a unique approach in that it viewed the PC as a household item, which could not be differentiated that much in terms of functions.

Cheifet noted that like Samsung, Hyundai was another large industrial conglomerate producing a wide spectrum of electronic components. In the past, those parts had gone into other companies’ computers but now they would go into Hyundai’s own products. Park said Hyundai was trying to serve a market that had not been well-served by other competitors from Japan and Europe. He thought that Hyundai was better positioned than those competitors in providing a low-cost product.

The People’s Republic of China also introduced its own PC clones, Cheifet said, albeit ones with unusual software for the western market. Yin Min, the deputy director of Guangdong Science & Technical Co., Ltd., said through a translator that the company planned to bring its own acupuncture and Chinese culinary software to the United States. The software could read and display in both Chinese and English, Cheifet said, adding the Chinese computers were available in all modern configurations, including an 80286 version with an 80 MB hard disk, a local area network, and even a Chinese-character spreadsheet.

The Second Generation of Portable PCs

Switching gears, Cheifet said that if there were any signs of visible progress at COMDEX it was the portable computers on display–which for the first time *had* visible displays. Thanks largely to some giant leaps in LCD technology, Zenith, NEC, and DataVue introduced new laptop portables with sharp, bright screens. For example, the Zenith Z-181 was one of the first machines offering the so-called super-twist or birefringent liquid crystal displays, which created a crisp blue-and-white screen with a 12-to-1 contrast ratio, about four times better than a conventional LCD.

To overcome the added weight and bulk of the new portables, Cheifet said that DataVue cut its new Snap computer in half: the main unit with the keyboard, CPU, and external ports; and a separate floppy disk unit connected by an infrared beam. (The floppy disk could also be swapped out for a hard disk.) Cheifet quipped that hopefully Snap users took the right half before they went out the door.

As for NEC, its entry in the new generation of portables was a slim compact machine with a bright, sharp screen and impressive processing power. Cheifet said the NEC MultiSpeed ran off the company’s own V30 microprocessor at either 4.77 or 9.54 Mhz, faster than many desktop units. The MultiSpeed also featured two 3.5-inch floppy disk drives and weighed about 11 pounds.

Unfortunately, Cheifet noted, second-generation hardware came with second-generation prices. Most of the units described above retailed for about $2,000.

Cheaper Laser Printers Meant Cheaper Desktop Publishing

COMDEX ’86 was also a showcase for desktop publishing, Cheifet said, relying on the usual Macintosh or PC, laser printer, and page description software. Increasingly, manufacturers were packaging these elements together and selling them as units. Hewlett-Packard unveiled a $7,750 system based on *Ventura Publisher*, which included a high-resolution color screen, a Macintosh-like user interface, and HP's own LaserJet printer.

Compatibility was also not restricted to cloning IBM's architecture as laser printer clones were also everywhere, Cheifet noted. And while most companies seemed stuck on the same basic internal design, at least the prices were dropping. Okidata presented a $1,500 laser printer (the LaserLine) with 15 resident fonts and up to 512 KB of memory. The LaserLine was compatible with the HP LaserJet and IBM software.

Cheifet said that Alabama-based QMS Inc., which built one of the first low-cost laser printers, had now moved into the high end with its QMS-PS 800+ machine, which incorporated Adobe's *PostScript* language, 35 typefaces, and 2 MB of RAM.

NEC also introduced three new laser printers known as SilentWriters that used a different type of technology. The SilentWriter directed the light beam through an array of LEDs, eliminating the mechanical rotating mirror used on most laser printers. John McIntyre of NEC explained that with a conventional laser printer, you had a single light source that scanned across the page and reflected by that mirror. The LaserLine, in contrast, had an array of about 2,600 LEDs across the page, each aimed at a particular location on the paper. So the LED fired as the paper passed by.

For more frugal desktop publishers, Cheifet said, there was Atari's booth, where software vendors promoted budget-priced publishing packages for the ST. Drafix showed a $300 computer-aided design package while British company MirrorSoft unveiled publishing software for under $200. Another British company, Excellent Software, had a publishing package retailing for under $50.

The Latest in Mass Storage

Cheifet said mass storage was also a major theme of this year's COMDEX, with attention split evenly between magnetic and optical media. Toshiba presented an 800 MB write-once optical drive that conformed to the new international 130mm standard size. Netherlands-based Phillips had also formed a new joint venture with Control Data Corporation called the Laser Magnetic Storage Corporation, which presented a demonstration of a 20-disc digital “jukebox.” Each 12-inch disc held 2 GB for a total of 40 GB. Laser Magnetic also promoted a half-height cartridge-based optical drive that could fit into a regular 5.25-inch floppy disk drive slot in a PC.

On the software side, Cheifet said that Delorme Mapping Systems showed a natural application of CD-ROM technology: maps. A single 600 MB disc held a database of maps of the entire globe. The user could choose between different scales by placing a cursor over the desired spot or by entering latitude and longitude coordinates.

The Next Floppy Disk Standard?

Wendy Woods took over for the next segment. She noted that there was a lot of hype and gimmicks at COMDEX. It was hard to sort through the inventions that would never see the light of day and those that would signify the next great trend. This was especially true when it came to data storage devices.

For instance, Konica demonstrated a promising new technology, the KT-510. Woods explained that Konica made a standard 5.25-inch floppy disk capable of storing 10 MB of data–the equivalent of 800,000 typewritten pages or 10 times what could be stored on a standard diskette. Konica had obtained eight patents on the new technology, which company spokesman Rich Freeland referred to as an “embedded servo position information system.” He said it was a technique for placing pieces of magnetic information on the diskette intermixed with data, which allowed for a much higher resolution of head positioning.

The question, Woods said, was could this product be positioned so that it became the next standard. Toshiba was asking the same question as it promoted its own 4 MB 3.5-inch diskette. This was accomplished using “perpendicular recording,” a technology that Toshiba was the first to offer commercially.

The Dawn of the Smart-Shoe Era

Switching gears–or maybe feet–Woods moved over to the Puma booth, where the footwear manufacturer showed off what it claimed was the world’s first computerized running shoe. Woods explained the back of the shoe contained a tiny microprocessor that registered foot strikes and had a timer. Once the user was finished running, they could plug the shoe into a PC loaded with special software and see their progress. In the demonstration, the computer showed a user ran the equivalent of one-tenth of a mile in two-and-a-half minutes, burning 13 calories in the process.

Jerry Cohen of Threshold Technology, which presumably developed the shoe for Puma, told Woods that there were 17 million runners in the United States, 12 million of whom were considered serious, competitive runners. For people in that latter group who trained a lot and needed accurate information, he saw a market for this type of product. Woods added that the Puma computer shoe was currently selling big in Canada but had only just been introduced in the United States.

Woods next highlighted the phonetic engine, a computer speech processing system that could change phonemes–the small units of sound that made up human speech–into text. She said the possibilities for this technology were “as limitless as the imagination.”

Finally, Woods discussed the PC Movie Maker, a system developed by CompuSonics Corporation that combined a high-capacity optical disk drive with special database software and peripheral cards to enable a PC to record audio and stereo inputs. John Stautner of Compusonics told Woods that a user could record hours of material per optical disk without the need for any magnetic tape. Woods pointed out the expense of the system might discourage people from buying it. Statuner replied that for under $10,000, there was no equivalent system and that CompuSonics’ goal was to bring the cost down.

Wrapping Up COMDEX ’86…and Looking Ahead to 1987

Following the end of COMDEX, Stewart Cheifet was back in the San Mateo studio with George Morrow sitting in the co-host's chair for a wrap-up round table discussion. The other participants were two *Chronicles* regulars–Jan Lewis of the Palo Alto Research Group and Tim Bajarin of Creative Strategies–joined by newcomer Hal Glatzer, the west coast bureau chief for *Software News*.

Morrow opened by asking Lewis about the prevalence of 386-based machines introduced at COMDEX. Lewis said there were a tremendous number of machines announced, which she classified as a "defensive move" for many vendors. But many of the announced machines would not be shipping for some time. And even the 386 machines that were available now were shipping in very small quantities.

Cheifet asked if there was actually any software out now to take advantage of the 386 machines. Lewis said that was the key question. At this point in time, there was no software available that specifically took advantage of the 386. Of course, you could run existing applications on the 386, and that raw speed would help if you were working with something like a very large spreadsheet or database. But the truth was that 386-specific software was still quite a ways from making it onto the market. She added that software for 286-based machines had still not caught up and probably would not arrive until mid-1987. So "God knows when" we would see 386-optimized applications.

Morrow turned to Bajarin and asked about the state of laser printing based on what he saw at COMDEX. Bajarin said the whole concept of desktop publishing had gotten people "jazzed." He chaired a session on desktop publishing at the show that drew 1,200 people. (They had to turn 400 more away.) But if you actually went to the show floor and tried to find a daisy wheel printer, you would have had difficulty. So laser printers were definitely starting to dominate the market.

Morrow next asked Glatzer about what he saw with respect to new software products at the show. Glatzer said that we rarely saw new software unveiled at COMDEX anymore. It was just impossible to run a good demo on the floor. But he followed larger organizational purchases of software, and what he noticed there was that everyone with an established application now had a local area network version. He chaired a session on LANs that drew a lot of people who were looking at complete systems and complete solutions for medium- and large-sized businesses that wanted to run their favorite applications in the network.

Morrow asked Lewis about the state of network hardware. Were we moving closer to adopting standards? Lewis said there was quite a bit happening in terms of local networking but there were still “many, many standards” competing for supremacy. Morrow said there was similar confusion over standards for laser printing. Bajarin agreed. He noted that Adobe had gotten a jump on things with *PostScript* and Hewlett-Packard had adopted DDL.

Cheifet asked about the prices of laser printers. How far were we from, say, a sub-$1,000 laser printer? Bajarin said the lowest prices he saw at COMDEX were between $1,600 and $1,795. But increased competition from firms like RICOH and Konica would, in his view, see prices come down to between $1,300 and $1,500 within two years. And by the time we got to 1989, he expected the prices would finally be under $1,000.

Morrow noted that the mood at this year’s COMDEX was much more optimistic than at the previous year’s event. How did the group feel about what next year would bring in terms where the industry was headed? Glatzer said he expected more of the same. He thought quite a few of the marginal companies had either dropped out or been bought by other companies. He felt that the show had reached its natural, optimum size. It was about 90,000 people two years ago and it had become almost too unwieldy. At 70,000 to 80,000 attendees, there was still a full house but things weren’t overcrowded. Lewis observed that there was definitely an upturn based on the amount of “legitimate business” actually conducted at the show.

Morrow asked if there was any general theme that we would see for 1987. Bajarin said he didn’t expect too many new users at the low end of the market. Instead, it would be more likely that the Fortune 2000 company employees who had PCs on their desks would go out and buy an $800 or $900 PC so they could take their work home.

U.S. Software Company Looked to Profit from Iran-Iraq War

Stewart Cheifet presented this week's "Random Access" segment, which was recorded in November 1986.

- As the Iran-Iraq war continued, Virginia-based BDM International was reportedly negotiating to sell computer wargame simulation software to Iraq to help it be more effective in potential attacks against Iranian oil and transportation system targets.
- The Reagan administration announced a new "Sensitive" classification for government documents. Cheifet said a "sensitive" document was not necessarily classified but it could not be placed in a computer database.
- China's Shanghai Software Consortium worked as a contractor to develop a number of software programs for prominent U.S. publishers, including Activision and McGraw-Hill. Cheifet said the Shanghai company had 25 programmers who worked on IBM compatibles (developed in China) and earned about $50 per month.
- Johns Hopkins University doctors implanted the first computerized pancreas into a patient. Cheifet said the artificial pancreas could be programmed by an external radio transmitter to alter the amount of insulin delivered to the patient's body.
- Paul Schindler reviewed *The Toy Shop* (Broderbund Software, $65), a program for designing and printing out parts to assemble paper toys like airplanes and starships.
- Accounting firm Coopers & Lybrand developed a new expert system for giving tax advice.
- General Information released *Hotline* ($29.95), a telephone number database and auto-dialer that included 2,000 commonly used national telephone numbers.
- The mayor of Lyons, Oregon, was surprised by a recent $1,300 bill for a new phone line that had been recently installed at the local public library to access the library system's mainframe in Salem, Oregon. Cheifet said that due to a software bug the PC "just kept calling" the mainframe, logging 87 hours worth of phone time in a month.

The Costs of Attending–or Not Attending–COMDEX

This episode largely discussed who *was* at COMDEX. But there were several notable absences from the show, including Apple, Commodore, Ashton-Tate, Digital Equipment Corporation, and Lotus Development. IBM did show up but canceled a scheduled press conference. AT&T had a large booth but didn't make any new product announcements, with a company spokesman telling the press, "This is a show for small companies."

The Apple and Commodore no-shows led much of the press to declare Atari the unofficial "winner" of COMDEX. Wendy Woods reported for *Newsbytes* that Jack Tramiel's company "has the excitement race wrapped up." Not surprisingly, much of that excitement was around audio products, including Midiplay, a 16-channel MIDI recording and playback system that cost $50, and *Metatrack*, a $100 program that linked a MIDI synthesizer to the Atari ST.

But as the *Chronicles* coverage indicated, the big theme of the fall 1986 COMDEX show was the prospect of new 80386-based PC clones. John Markoff of the *San Francisco Examiner* said a colleague counted 107 companies on the floor that planned to sell a 386 computer. IBM was not among them, as it would not unveil its successor to the PC line–the IBM PS/2–until April 1987. Big Blue's official excuse for the delay was that it was waiting to finish its 386-specific operating system before releasing a 32-bit PC. (That would be OS/2, which was ultimately released eight months after the PS/2, in December 1987.)

Apple's reason for not attending COMDEX at all was also quite simple: John Sculley's company had no interest in any event where it wasn't the center of attention. Markoff said this heavy-handed approach might "prove to be a strategic blunder," particularly with respect to Apple's lead in the desktop publishing market. After all, the new 386 machines promised to close the gap with the Macintosh on that front, as even Aldus featured its PC port of *PageMaker* at COMDEX. Still, Markoff reasoned that if IBM managed to fragment the PC standard with its eventual 386 machine, that would still leave Apple's Macintosh as "an attractive alternative."

Another possible reason that Apple and some of the other prominent companies may have skipped COMDEX was the cost. This wasn't a cheap show to attend. According to a November 1986 report in the *Los Angeles Times*, COMDEX organizers charged exhibitors $24 per square foot for space on the floor. One exhibitor, Xebec, told the *Times* that it paid $63,000 just to get its foot in the door. Xebec then spent an additional $150,000 to design a two-level booth, and another $30,000 to actually have it shipped to Las Vegas and built. And that didn't account for the labor costs of running the booth during COMDEX. Another exhibitor, Panasonic, said it cost about $17 per person per minute to have its 20 employees staffing a 5,000 square-foot booth for five days.

Notes from the Random Access File

- This episode is available at the Internet Archive and has an original broadcast date of November 20, 1986. The COMDEX/Fall '86 show itself was held from November 10 to November 14, 1986.
- Dr. Chong-Sup (C.S.) Park spent many years as a senior executive for the South Korea-based Hyundai Electronics, which was part of the Hyundai Group conglomerate. In the 1990s, Hyundai acquired the U.S. hard disk drive manufacturer Maxtor, and Park served two stints as that company's CEO from 1995 to 1996 and 2004 to 2006. In 1996, Park became president and CEO of Hyundai Electronics America. When the Hyundai conglomerate broke up in the early 2000s, Hyundai Electronics became Hynix Semiconductor Inc. Park continued to serve as CEO of Hynix until 2002. He currently serves as a board adviser to Nyriad, Inc., an enterprise storage company.
- John McIntyre spent nearly 16 years at NEC as a marketing director. In 1995, he joined Lyra Research in Massachusetts as vice president of marketing. He returned to the tech industry in 2007 as a marketing manager with Samsung Electronics. His most recent position was with BPO Media, a market research firm for the office technology industry.
- Hal Glatzer began his journalism career in Hawaii in the 1970s. After moving back to the U.S. mainland in the 1980s he wrote and edited for a number of tech industry publications and authored *Introduction to Word Processing* for Sybex in 1981. His first novel, *The Trapdoor*, was published in 1986, and during the 2000s he transitioned into primarily

writing mystery novels and plays, including *Sherlock Holmes & The Volcano Horror*, a stage adaptation of the 1910 Arthur Conan Doyle short story, "The Adventure of the Devil's Foot." Glatzer currently resides in New York City.

- Konica's 10 MB KT-510 floppy disk drive never quite took off. *Electronics* magazine reported in November 1987 that Konica had a number of delays just getting its 5.25-inch drive into production. Meanwhile, IBM released its PS/2 computer with a 3.5-inch disk drive, which made it "unlikely that makers of PC-compatible systems will incorporate the KT-510 into their systems."
- According to Dami Lee of *The Verge*, the Puma computerized shoe–officially the RS-Computer running shoe–featured at COMDEX was not really the first of its kind. Adidas released a similar product called the Micropacer in 1984. But Puma still decided to celebrate its historic shoe by manufacturing 86 pairs of an updated RS-Computer shoe in 2019, which Lee said retained the original 1986 look but now featured "a three-axis accelerometer, LED indicators, a USB port for charging, and Bluetooth to connect the shoe wirelessly to your phone."
- Paul Schindler would also feature *The Toy Shop* in the *Computer Chronicles* 1986 year-end holiday buyers guide.

Chapter 12: Time Line, Microsoft Project, and SuperProject Plus

Project management software was in the midst of a boom in the late 1980s. According to a May 1987 report from Wendy Woods' *Newsbytes*, one company claimed that sales of project management software had increased an astounding 315 percent from February 1986 to February 1987. This likely reflected the growing adoption of minicomputers in offices and large organizations, and the fact such PCs were now powerful enough to handle complex software that had once been the exclusive province of larger mainframes and minicomputers.

This next *Computer Chronicles* episode from November 1986 was all about project management software. Stewart Cheifet opened the program by showing George Morrow, this week's co-host, *MacProject*, which as you can probably guess was a project management program for the Macintosh. Cheifet described *MacProject* as a "series of spreadsheets." So why did someone need specialized project management software as opposed to just using multiple spreadsheets? Morrow retorted that years earlier, people said the same thing about spreadsheets, i.e., they were just specialized databases. And while you could do project management with multiple separate spreadsheets, that would involve a lot of programming just to get the spreadsheets to talk to one another. Using project management software meant you didn't need to be a programmer. Cheifet agreed and quipped, "Nobody wants to be a programmer, we know that's a lot of headaches."

Keeping the Space Telescope (Sort of) On Time

Wendy Woods presented her first remote segment from Lockheed Corporation in Mountain View, California. Lockheed was overseeing construction of what Woods said was "one of NASA's most ambitious projects," the Space Telescope, which began in 1978. (Woods is referring here to the Hubble Space Telescope, although she never used that name.)

Once anchored in orbit, the mammoth telescope would detect objects 50 times fainter than those observable from Earth, expanding the "visible universe" by 350 times.

To plan and manage a project of this complexity, Woods explained, Lockheed used a high-level project management system called *Metier Artemis*. The system was based on CPM, or *critical path method* (not to be confused with Digital Research's CP/M operating system). CPM established the proper order and relationship of each individual task.

Woods said that CPM itself was an extension of the PERT chart, i.e. the *program evaluation review technique*. On a computer screen, this translated to a network of boxed events interconnected according to their priority and scheduled completion. The "critical path" was the main route to completion of the project, from which lesser tasks branched off.

Lockheed originally planned 10,000 activities for the Space Telescope, Woods said, but that quickly expanded to over 30,000, each of which might have to be changed due to time and resource constraints. Before *Artemis*, scheduled changes could take 4 to 5 months. Now they could be done in a few days.

Sadly, Woods noted, the Space Telescope's original launch date in early 1985 was postponed due to the budget shift from peacetime space exploration to developing new space weapons. Today, the telescope sat idle waiting for the next Space Shuttle mission–and perhaps a new era of humanitarian space research.

Battle of the Gantt Charts

David Bryan and Jim Dunningan joined Cheifet and Morrow for the first studio round table segment. Bryan was vice president of product marketing with Breakthrough Software, which published *Time Line*. Jim Dunnigan was Microsoft's project manager for its, uh, project management software, *Microsoft Project*.

Following up on the introductory discussion, Morrow asked Bryan to explain project management software to someone who was already familiar with spreadsheets. Bryan said a spreadsheet could just be a column of numbers that you added up. Similarly, a project manager had the same kind of components in it, except instead of numbers they worked with tasks. The tasks related to one another in the same way as numbers in a spreadsheet. As you adjusted the time for one task, the software automatically adjusted the times for all the other tasks, which in turn changed the project's completion date.

Cheifet asked Bryan to demonstrate *Time Line*. Bryan showed a sample project–a kickoff for an advertising campaign–where the software displayed a sample chart of the various tasks involved, such as market research and client presentation. The software also displayed a list of the people who would be working on each of those tasks. There was also a bar chart (known as a Gantt chart) on the right indicating when those tasks were scheduled to take place.

Cheifet asked how these charts actually helped someone handle a project. Bryan said one thing you could see was that there were three gaps in the schedule, where the estimated tasks were expected to be two days late in their completion, as indicated by two right-facing arrows on the chart. He explained that this was a real common problem in project management. One way to address this would be to stack multiple tasks to overlap–as opposed to finishing them back-to-back–to open up two additional days for the task that required more time. Bryan then showed how to do this using *Time Line*. The software could also produce "before" and "after" charts.

Time Line could also flag "resource problems," Bryan said. He pulled up a histogram showing the schedules for an account executive and their assistant. The chart indicated the executive was "overbooked." Morrow clarified that this was triggered by the previous change to overlap tasks. To resolve this new problem, Bryan went back to the Gantt chart and selected the executive in question. He could then add the executive's assistant as an additional "resource" and reallocate the executive's time to eliminate the resource conflict.

Cheifet then turned to Dunnigan and asked him how *Microsoft Project* differed from *Time Line*. Dunningan said *Project* was different in a couple of ways. One difference was that *Project* had individual resource calendars. So if a particular employee was going to be on vacation for two weeks, or a piece of machinery was unavailable for several weeks, you could go into the software and block that time out on the resource's individual calendar. The program would then take that unavailability into account when creating the project schedule.

Cheifet then asked Dunnigan for a demonstration of *Project*. Dunnigan pulled up a sample project file, which like *Time Line* displayed a Gantt chart. He noted that *Project* used a command-line interface on the bottom of the screen, which was similar to other Microsoft products. He then showed how to edit items in the Gantt chart itself.

Morrow asked Dunnigan about the types of problems Microsoft had providing telephone support to customers for *Project*. Was it more difficult than, say, word processors? Dunnigan said they got a lot of questions from people who were new to project management. They may have previously scheduled projects using a database or spreadsheet and they had questions about concepts like CPM.

Cheifet asked Dunnigan how you would go about solving a hypothetical problem in *Project*. Dunnigan pulled up a list of resources. The system would beep if he tried to overschedule a particular resource. Dunnigan then showed how to resolve that problem, which was similar to Bryan's earlier method for handling the same issue in *Time Line*. Cheifet pointed out that *Project* also showed the costs associated with each resource. Dunnigan said this made it possible to cost out the entire project. Morrow clarified those cost projections would automatically update as resources were added to the project.

Cheifet asked about the prices for these project management packages. Dunnigan said the suggested retail price of *Project* was $395. Bryan said *Time Line* sold for $495. Morrow noted a few years ago, this type of software cost $100,000 and ran on mainframes. Did customers believe you could get the same performance on a microcomputer? Bryan said initially many customers had their doubts but they were resolved after trying the software. Morrow interjected–and Bryan concurred–this should make the vendors of the $100,000 software nervous.

Cheifet asked who was actually using project management software. Bryan said that *Time Line* was most commonly used at the “bottom level,” i.e., the spot where a user was responsible for a sub-project or sub-assembly to manage that particular area. *Time Line* also linked to another product called *OpenPlan*, which could handle much larger projects with hundreds of thousands of tasks.

Using Project Management Software to Design Software

Wendy Woods returned with her second remote segment, this time from The Droid Works, a company started by filmmaker George Lucas to develop a commercial videodisc-based editing system known as the EditDroid. Woods explained that the EditDroid’s software could handle up to eight separate sources of videos at once. This in turn required the use of project management software.

Woods said that Michael O’Brien, a senior software engineer at The Droid Works, and his team designed the EditDroid’s software using *Micro Planner*, a Macintosh project management program. O’Brien said that before using *Micro Planner*, much of his team’s planning was done *ad hoc*, i.e., writing things on the backs of envelopes. The planning software had turned around this whole process for the better, he said.

Micro Planner required a person to sit down and think about a project in advance. In turn, the software provided a clear path to achievement of results. It may seem strange that software was being used to manage a software project, Woods quipped, but as O’Brien told her, the business of creating software had traditionally been one of the least well-planned activities in the world.

Could “Hip Shooters” Benefit from Project Management Software?

Nancy Ann Twomey and Glenn Katz joined Cheifet and Morrow for the final segment. Twomey was a product marketing manager with Computer Associates, which published *SuperProject Plus*. Katz was director of the construction executive program at Stanford University.

Morrow asked Katz for some background on project management software. Katz said it arose out of the U.S. Department of Defense in the 1950s. The Navy needed to develop software to manage some of their projects like the Polaris missile. Since then, project management had expanded into other areas, notably the construction industry. Now it was continuing to work its way into a number of new markets.

Cheifet asked Twomey about those new markets. Twomey said project management was used in a variety of applications ranging from the production of a television show like *Computer Chronicles* to developing large charity drives. She said that project management software was now widely used in the banking industry as well. Morrow added that many software companies were using such programs themselves.

Cheifet asked Twomey for a demonstration of *SuperProject Plus* and how it differed from the two programs seen in the previous studio segment. Twomey said the goal of *SuperProject* was bringing in new users, so the software included an extensive on-line help system and glossary of key terms. For her demonstration, she pulled up a sample sales promotion program. She explained the program worked off a pull-down menu structure and offered nine different views of the project information.

Twomey displayed a PERT chart view of the sequences of tasks for the sample project. She explained how you could create a new project and layout individual tasks using boxes connected by arrows. Morrow noted there were different colors indicating different functions. Twomey said red diamonds indicated critical tasks and blue diamonds were for non-critical tasks. Cheifet then asked Twomey to demonstrate some of the software’s other views. Twomey highlighted one feature of the program called “resource leveling,” which basically went through all of the available resources and came up with a schedule to finish a specified task.

Cheifet asked Katz how big a project needed to be before using this type of software. Katz said size wasn't the critical consideration as much as whether or not you could use the information that the product provided. The type of manager who could use project management software was one who could, given some knowledge of how to manage projects, make a good decision about whether to change the order of the projects, allocate additional resources, have people work overtime, et cetera. But in terms of size, you could have a project with just two people that would benefit from the software, all the way up to multi-million dollar construction projects.

Morrow noted there was a lot of "emotion" associated with project management software that you didn't see with something like spreadsheets. Why did Katz think that was? Katz said it was because these types of programs got at the heart of how you managed people, and managers took that very personally. A lot of the products wanted you to become very rigid or precise in following certain rules to plan a project. Yet some of the best project managers were people who "shoot from the hip."

Morrow followed up, asking Katz how he would teach someone like that–i.e, a hip-shooter–and help them use project management software to be a "better hip-shooter." Katz said the important thing was how they tried to model their project. Rather than breaking everything down into microscopic detail, model the level of detail based on how that manager was used to thinking about things. The goal was to make the tool compatible with their management style. Morrow asked if you could actually break things down in even greater detail. Katz said yes, many programs now supported "sub-networking," where you could take a more detailed schedule and roll it up for the higher levels of management so they didn't get bogged down in details.

Cheifet observed that many people complained that project management software was difficult to use. How did Twomey respond to that concern? Twomey said there was a general misnomer that if you bought project management software, that automatically made you a project manager. That wasn't an absolute association. But you needed to look at the products in terms of how intuitive they were, how accessible the interface was, and the user’s level of project management. She said the learning curve averaged from a day to a week in most cases.

FCC Found Most PC Clones Not FCC Compliant

Stewart Cheifet presented this week’s “Random Access,” which was recorded in November 1986.

- The Electronic Industry Association reported that computer sales for the first nine months of 1986 were down more than 9 percent from last year–but overall sales of electronic devices were up by about 8 percent.
- A *Trenton Star-Ledger* survey found that 41 percent of respondents planned to buy a personal computer within the next few years.
- *Fortune* named the Compaq DeskPro 386 as one of its top 10 “Products of the Year” for 1986. Cheifet said other products honored included the Lasertag toy gun and the new Bruce Springsteen five-record set (*Live 1975–85*).
- Compaq said it had already shipped more than 10,000 of the DeskPro 386 computers. Cheifet said the company also announced an update to the DeskPro 286, which featured a 40 MB hard disk drive and seven expansion slots.
- John Maxfield, a “computer security consultant,” claimed that nearly 40 percent of existing computer bulletin boards provided information to criminals.
- The Federal Communications Commission found that only about 15 percent of PC clones displayed at the recent COMDEX show met the agency’s signal emissions standards.
- Paul Schindler reviewed *Time Bandit* (MichTron, $40), a collection of 16 maze-type games for the Atari ST.
- Novell and 3Com were no-shows at the recent LocalNet ’86 trade show in San Francisco.
- The American Bar Association introduced the first online continuing legal education program for lawyers.
- The online service NewsNet added the Xinhua news wire from China.
- *Hoops*, a new $50 basketball simulator for the IBM PC and compatibles, included data form the top 200 college teams of the past

35 years.

Former Kildall Associate the Brains Behind Computer Associates’ Project Management Software

Perhaps the most interesting story from this episode is that two of the products demonstrated–*Time Line* and *SuperProject Plus*–nearly ended up under the same owner, namely Computer Associates.

But let’s back up a bit. Computer Associates (CA) did not originally develop either program. Charles Wang started CA in 1976 as a joint venture with a Switzerland-based company also known as Computer Associates. The New York-based CA initially focused on marketing software by telephone. After some early success licensing a data-sorting program called CA-SORT to enterprise customers, CA basically built its business by aggressively acquiring small software companies.

Among CA’s early acquisitions were Information Unlimited Software (IUS) in 1983 and Sorcim in 1984. CA merged the two companies together into a new division called Sorcim/IUS, which focused on software for personal computers. Sorcim/IUS subsequently acquired a project management program called “Plan*It” from its original developer, Alan Cooper.

Cooper himself had a long association with *Computer Chronicles* co-host Gary Kildall. Cooper was one of Kildall’s students at the Naval Postgraduate School in Monterey, California. Later, Cooper joined Digital Research as one of its first research and development employees. After leaving DRI in the late 1970s, Cooper started writing his own business software applications. In a 2020 *Medium* article, Cooper recalled that “it wasn’t until 1983 and about 15 major business and personal software products later that I began to develop a more effective approach” to making software more user-friendly. It was around that time he started writing “Plan*It” as a critical-path project management program.

CA renamed “Plan*It*” SuperProject Plus* and later versions *CA-SuperProject*. At some point in the 1990s, CA changed the product’s name to *AllFusion Project Planner*. It’s hard to nail down exact dates since CA licensed the software to enterprise customers–as opposed to selling it in retail boxes–but as best I can tell, support stopped sometime before 2002.

As for *Time Line*, it was developed by the previously mentioned Breakthrough Software Corporation. This company had a very short lifespan. It was incorporated in California in April 1984. The two principals were a married couple, William and Victoria Lohse, and from what I can tell *Time Line* was their sole product.

Time Line enjoyed some success in the market, and by October 1986, the Lohses were ready to cash out. They initially agreed to sell Breakthrough Software to Integrated Software Systems Corporation (ISSCO), a company that specialized in computer graphics. But while that deal was pending, CA’s Sorcim/IUS division agreed to acquire ISSCO. A December 1986 *InfoWorld* report suggested that Breakthrough had now decided to scuttle the ISSCO deal, largely due to concerns that CA would phase out *TimeLine* in favor of its competing *SuperProject* product. A few months later, in February 1987, the Lohses sold Breakthrough to Symantec, which continued to revise and update *Time Line* until a final 6.0 release for Windows in 1994.

Notes from the Random Access File

- This episode is available at the Internet Archive and has an original broadcast date of November 24, 1986.
- Jim Dunnigan remained with Microsoft until 1993. He then shifted careers into education, working as an elementary and high school teacher for most of the next two decades. In 2012, he moved into higher education, first as an adjunct professor at Seattle University and most recently as a faculty member at Arizona State University’s teachers college.
- Nancy Twomey remained with Computer Associates until early 1987, when she moved to a product marketing position with Tandem Computers, and later held marketing positions with Compaq, Hewlett-

Packard, Adobe, and WebEx, among other companies. Her last known position was with the cloud services company VMware, from where she retired in 2018.

- Glenn Katz is still affiliated with Stanford University, where he's been a lecturer in the school's civil engineering department since 2004. He also owns his own architectural design firm, Bearington Studios.
- Debra Wilrett developed *MacProject*, which Stewart Cheifet demonstrated during the studio introduction. Wilrett continues to work in software development today.
- The Hubble Space Telescope was not deployed until April 1990, more than three years after this episode aired. Wendy Woods did not mention this in her report, but a planned 1986 launch date was scrapped due to the loss of the Space Shuttle *Challenger* in January 1986 and the subsequent grounding of the remaining shuttle fleet. When the Space Shuttle *Discovery* finally carried the Hubble into orbit, the price tag for the project had climbed to $1.5 billion, according to a United Press International report, "making the instrument the single most expensive civilian science payload ever launched."
- As for *Metier Artemis*, Houston-based Metier Management–which was actually a subsidiary of Lockheed Corporation–would port its mainframe project management software to the PC in June 1987.
- *Time Bandit* didn't start out as an Atari ST program. The original game was released for the Tandy TRS-80 in 1983. Harry Lafnear, who co-designed *Time Bandit* with Bill Dunlevy, said in a 2003 interview with *Atari Legend* that he believed the game sold about 75,000 copies across all platforms, with most of those on the ST. He said there had also been work done on a sequel, but that was abandoned after both he and Dunlevy left the publisher, MichTron.
- Stewart Cheifet described John Maxfield as a "computer security consultant" and expert. The real story behind Maxfield was quite a bit more complicated. According to a 2016 report by Matt Novak for *Gizmodo*, Maxfield was a "former phone phreak who fancies himself the proto-internet's sheriff," and who "gained the trust of teen hacker communities on bulletin board systems (BBSs) in the early 1980s and fed the information to the FBI." Maxfild subsequently became known as the "most loathed man on the internet" after his information led to a

series of FBI raids in 1983. Maxfield himself has apparently not been publicly seen or interviewed since the early 1990s.

- George Lucas’ EditDroid proved to be a commercial flop and The Droid Works company itself closed up shop in 1987. Tom van Klingeren directed a short documentary in 2005, *EditDroid: Rise and Fall*, which provides an overview of the product’s history.

Chapter 13: Venture's Business Simulator, PC Type Right, The Toy Shop, and Thomas M. Disch's Amnesia

The second annual buyer's guide episode of *Computer Chronicles* aired in early December 1986. Although the Intel 80386-based PCs were the hot items coming out of COMDEX a few weeks earlier, the *Chronicles* gang chose to focus their gift-giving ideas on the software and small-scale hardware side of the computer industry.

On that note, Stewart Cheifet opened the program by showing George Morrow–sitting in for Gary Kildall for the second week in a row–the Selectronics PD-100, a credit card-sized computer with a keypad and 2 KB of memory that functioned as a "personal directory." Cheifet demonstrated how you could use it to keep a Christmas shopping list. Morrow retorted, "How long did it take you to put all that [information] in there, Stewart?" Cheifet laughingly replied it didn't matter since he had a "lot of fun" playing with the device.

More seriously, Cheifet said the Christmas shopping season was very important to lots of businesses such as department stores. How important was it to the computer industry? Morrow said this year it would be a little more important than usual due to the looming changes to the federal tax code. (The United States Congress adopted a major Tax Reform Act in 1986.) This meant that a lot of people would be spending money at the end of this year to buy computer equipment that they might not have otherwise. On the lighter side, Morrow said that "hope beats eternal" in the computer industry each Christmas someone will find a product that succeeds in the home market.

Assemble the Usual Suspects

Computer Chronicles regulars Wendy Woods and Paul Schindler were the sole "guests" for this episode. As was established in the prior Christmas buyer's guide program, these next two segments were “round robins” where each panelist presented ideas for computer-related holiday gifts.

Venture Business Simulator

Cheifet went first, demonstrating *Venture’s Business Simulator*, which he said was developed by people who taught at the Wharton School of Business at the University of Pennsylvania. He said this $99 disk contained a series of business case studies actually used at the school. And much like *Flight Simulator* allowed you to simulate flying and crashing a plane without hurting anyone, you could use *Business Simulator* to simulate running and “crashing” a business without actually going bankrupt. (Morrow joked he should have gotten this program based on his own company’s recent demise.)

Cheifet explained that *Business Simulator* provided a number of informational screens in the forms of annual reports, “newspaper” articles, and even memos from company executives. The player could then make decisions regarding the business, such as how to price your product, how much to spend on advertising, whether to expand manufacturing capacity, and so forth. The program then processed those decisions and simulated the business for one year.

Morrow asked if this was “true simulation.” Cheifet said it was based on six real case studies used to teach MBA students. Reality Technologies, the company behind the product, also said it could make “custom” case studies tailored to a particular business or product.

Norton Utilities 3.1

Morrow went next and recommended *Norton Utilities 3.1*. He noted the program had “saved my life twice this year.” He elaborated that he had a 12 MB database to keep track of his record collection. The database was corrupted somehow and *Norton* helped him recover the data. Otherwise, it would have taken him over a month programming in assembly language to get his files.

Schindler chimed in that one key feature of *Norton* was an “unerase” function that you could use to recover previously deleted files. Morrow added that there were other programs on the market that provide unerase functionality. But *Norton* was the only one that he knew of where the user could go in and “fiddle” with a file if necessary.

Xerox PC Type Right

Cheifet turned to Woods and asked her to explain the “mysterious white box” that she brought. Woods said it was the PC Type Right, a hardware-based spelling checker made by Xerox. She said that anyone who used a traditional spell checker program knew how much memory it took up, so by the time you got to your document there was very little RAM left.

The Type Right was separate from the computer. You plugged a cable from the Type Right into the keyboard port on a PC, and then plugged the cable from a detachable keyboard into the Type Right. The unit would then monitor the user’s typing and beep when a word was misspelled. Woods said the device had a 100,000-word vocabulary and could be customized to add about 1,200 additional words. Cheifet asked about the price. Woods said it sold for about $200. Xerox had just announced this product at the November COMDEX show, so it was still getting out onto store shelves. She added the $200 price was about what you would pay for a good software-based spelling checker.

A picture of the Xerox PC Type Right taken from a 1987 magazine ad. The device is a long white box with two black cords plugged into the back.

Schindler said he thought the Type Right was a “fantastic idea.” He also needled Morrow because he apparently didn’t care much for spelling checkers. Morrow replied that he never used to like spelling checkers but he was now using one. It helped him go from spelling about 60 percent of his words right to over 95 percent. (Morrow pointed out that he never passed a high school English course.)

A Couple of Books and Looking Your Best

Schindler began his turn by recommending a pair of books. The first was *The IBM XT Clone Buyer's Guide* by Edwin Rutsch. Morrow quipped that this was probably the only book on the face of the Earth that was out-of-date 10 minutes after it went to press. Schindler conceded the point but said the book offered general advice on what to look for when buying a computer. (According to the *Whole Earth Review*, the self-published book was actually updated monthly, presumably to account for new machines.)

The second book Schindler recommended was *More Than You Ever Wanted to Know About Hard Disks for the IBM PC* by Robert E. Brown, who was himself a *Chronicles* guest back in December 1985. Schindler noted–and Morrow concurred–that not all hard disks were created the same. They had different access times, different prices, and different capacities. (And, Morrow added, different things that could go wrong with them.) Brown's book offered a thorough examination of every hard drive available on the market. Morrow said every computer user group should have a copy. Schindler agreed.

Schindler then turned to a brief software demonstration of a $35 program called *Looking Your Best* by 1 Step Software. Schindler said the program was a "clothing adviser." The user could input information about their body type and shape and the software would provide advice on how to "dress for success." (For some reason, Schindler demonstrated the "female" version of the program, although there was also a "male" version available.)

Would "Flashy Newcomers" Attract Home Computer Buyers?

Wendy Woods presented a single remote segment from Winner's Circle Systems, a Berkeley, California, computer store. She said that December was here, and once again, computer owners were faced with a surging need to buy, much to the pleasure of computer retailers. Some computer owners were ready to upgrade their systems, while others simply wanted accessories or gifts for their computer-savvy friends.

Whatever the motivation, Woods said, sales were climbing and retailers were optimistic. Andy Jung, the manager of Winner's Circle Systems, said his store's sales had actually improved over last year. Sales going into Christmas last year were very high, and this year they were running about four times higher.

Woods said that many shops prepared for Christmas by increasing their stock of high-priced luxury goods. But computer vendors were in the awkward position of balancing sales between corporate buyers and a growing consumer market that was also becoming more sophisticated. Jung said that in the past, people were looking for systems under $500. The average consumer now was budgeting between $1,500 and $2,000 for a computer purchase, which matched the inventory he kept in the store.

Woods noted that this year's "flashy newcomers" like the Amiga, the Atari ST, and the hard-to-get Apple IIgs provided attractive floor demonstrations in the store. But they may not have the lasting impact of lower-priced and more powerful machines. Jung explained that back in 1979, there wasn't the same variety of computers available. An Apple II with 16 KB of RAM sold for $3,500 back then. Today you get an Apple IIc with 128 KB for under $1,000.

The HP Business Consultant

The panel returned for a second round robin. Cheifet opened by showing Morrow the Hewlett Packard HP-18C Business Consultant, which was something of a pocket computer-calculator hybrid. The device had six user-defined function keys that could store formulas. For example, Cheifet created a formula to calculate the cost of renting a car. He then showed how you could send calculations from the Business Consultant to a small printer via an infrared connection.

The Muppet Learning Keys Keyboard

Cheifet had one more product to show, this one targeted at kids: The Muppet Learning Keys keyboard by Sunburst Communications. It was designed to help little kids get comfortable with using a computer. Instead of a QWERTY-layout, the keyboard was presented in an A-Z format to help children learn the alphabet. Cheifet demonstrated some educational software that came included with the keyboard. Pressing a letter such as "H" would bring up an item whose name started with said letter, in this case an anthropomorphic hamburger. And pressing the number "3" brought up three pictures of the same hamburger.

Morrow asked how the keyboard connected to the computer, which in this case was an Apple IIe. Cheifet said it plugged into the Apple's joystick port. He added that the keyboard replaced a lot of the traditional function keys with pictures that were easier for a child to understand. For instance, instead of `ENTER` there was an image of Kermit the Frog on a motorcycle with the word "GO".

SAT Prep Software

Morrow, continuing his utilitarian approach to gift-giving, recommended *Barron's Computer Study Program for the S.A.T.* He noted the package came with 6 to 8 disks. The program provided information on how to study for the test and how much time to spend on questions. He noted the SAT was getting to the point where they were like the entrance exams used by Japanese universities. So there was greater pressure to pass, and he thought that the software offered better prep than a traditional book.

The Toy Shop and the Kurta Pen Mouse

Schindler–along with models of a catapult, carousel, and car–went next. The models were made with what Schindler called "the hot computer toy" for this Christmas season, *The Toy Shop* by Brøderbund Software. Schindler explained that the paper plans for all the toys displayed came from this program. He showed how the toys actually "worked," e.g., the carousel actually turned, the catapult fired spit wads, et cetera.

> Paul Schindler sitting at the desk on the set of “Computer Chronicles.” On the desk in front of him are three paper models of a catapult, carousel, and open-air car.

Schindler noted that Brøderbund actually provided these finished models for the studio demonstration. But he’d already made some models himself at home and planned to make several more. He said *Toy Shop* was a great project for a parent to do with their kids. You could also personalize the models by putting in a child’s name or changing the patterns. Morrow said the appeal of this type of program was that it let you put something together after the computer did its work. Cheifet observed that *Toy Shop* was basically a “mini-CAD” program. Schindler agreed, adding that once the computer printed out the basic parts for the model you added other items such as wood and glue.

Schindler also briefly demonstrated the Kurta Pen Mouse, yet another product recently unveiled at COMDEX. For “people who don’t like mice,” as he put it, this device was a $300 electronic pen that moved across a pad, which in turn moved a cursor across the computer screen. Schindler said it took about an hour or two to set the device up, which was why there wasn’t time to do an actual studio demonstration. Cheifet noted the device was similar to a Koala Pad. Morrow cautioned that the Pen Mouse contained a small radio transmitter, so if you got close to another RF source like a television or radio signal there could be interference.

Thomas M. Disch’s Amnesia (and a Chocolate Floppy)

Woods provided the final product demo for the episode, a text adventure game published by Electronic Arts called *Thomas M. Disch’s Amnesia*. She explained the setup of the game: The player woke up without any clothes in a hotel room. The player had amnesia and needed to figure out where they were, how to get clothes, and so forth. Schindler interjected to say that all the games from Electronic Arts were great. He didn’t want to give any company a “blanket endorsement,” but he “never played a bummer from these guys.”

Woods described the game as “fascinating” and that everyone who had played the game at her house had enjoyed the experience. *Amnesia* was set in Manhattan and came with a map of the local subway system, which was programmed into the disks. There was also a cross-street indicator (a code wheel) and a telephone directory included as part of the documentation. Morrow asked if *Amnesia* always had the same outcome. Woods said no. She’d played the game 5 or 6 times and found a number of different endings.

Finally, Woods recommended a novelty gift called “The Chocolate Byte,” a 5.25-inch floppy disk made out of chocolate that was only available during the holiday season.

What Would IBM Do in 1987?

Stewart Cheifet presented this week’s “Random Access,” which was recorded in December 1986.

- Rumors were still building about IBM’s plans for 1987, including the unveiling of the PC-2, which was expected to be a $1,000 PC with 3.5-inch disk drives and a modified Intel 8086 chip. Cheifet said analysts expected a new flood of software to take advantage of the PC-2 design–software that would not run on PC clones.
- It was also rumored that IBM would unveil the PC-2 in a Super Bowl commercial. Cheifet said that Apple might also use a Super Bowl ad to announce a PC-compatible machine.
- Other predictions for 1987 included IBM releasing a 386 machine and an upgraded PC convertible.
- Ashton-Tate announced it would come out with “subsets” of its *dBase III* program for 386 computers. Cheifet said Ashton-Tate would “unbundle” *dBase* so the program’s separate modules could take better advantage of the 386 chip’s power.
- Commodore said its Quantum Link was now the second-biggest online service after CompuServe. Cheifet noted that Quantum Link currently only worked with Commodore machines, but that the service would be opened up to IBM and Apple users sometime in 1987.
- Two Pennsylvania doctors said a “lack of circulation” in the thighs of computer users could lead to blood clots.
- Paul Schindler reviewed *Perspective* (3D Graphics, $300), a program for making monochrome three-dimensional graphs.
- *BusinessWeek* predicted a good holiday season for software sales, with Brøderbund’s *The Print Shop* and Infocom’s *Leather Goddesses of Phobos* expected to do well.
- Syndicated computer columnist John C. Dvorak recommended a Macintosh game called *Smash Hit Racquetball* and Borland’s *Traveling SideKick* for the

PC, as well as the Beck-Tech's Fanny Mac (a cooling fan for the Macintosh) and the Curtis Computer Tool Kit.
- *Family Computing*'s annual shopping guide named the Atari 1040ST ($999) and Tandy Model 102 portable ($499) as "Best Deals," the Toshiba P-321 ($699) as the "Best Printer," the NEC MultiSync Monitor ($899) as the "Best Monitor," and the Leading Edge Model L ($149) as the "Best Modem."
- WGBH, the public television station in Boston, planned to conduct the world's first "online auction" in February 1987 as a fundraiser.

EA's Growing Pains as a Publisher and Distributor

Paul Schindler's ringing endorsement of Electronic Arts as a company may sound ridiculous to people today who complain about EA's approach to developing games–especially in light of the recent backlash to *Madden 23*–but as with all such statements, context is key. The EA of 1986 was still very much a start-up firm. Two-time *Chronicles* guest Trip Hawkins started EA in 1982, shipped the company's first games in 1983, and didn't take the company public until 1989.

During this early period EA was also primarily a publisher, not a developer. EA's producers acquired most of the company's games from third-party sources. That was true of not just *Thomas M. Disch's Amnesia*, but also *Venture's Business Simulator*, two of the products recommended in this episode.

Business Simulator might sound like an odd fit for EA, but again, this was not the modern game studio with blockbuster franchises like *Madden* and *The Sims*. (*Madden* actually was in development for the Apple II in 1986, but EA did not release the finished product until 1989.) Like many early computer game publishers, EA put out a lot of programs that were not strictly "games" in order to survive the mid-1980s decline of the original home computer market. This was how you got something like *Business Simulator*, which targeted a professional audience who might be willing to pay $100 for a piece of software.

Stewart Cheifet's description suggested that *Business Simulator* came out of the University of Pennsylvania's Wharton School of Business. That's indirectly true. Two Penn graduates, Mark Goldstein and Doug Alexander, started a company called Reality Technologies, which developed *Business Simulator* as a PC adaptation of software they had used on a DEC minicomputer while at Wharton. Reality signed an "affiliated label" agreement with EA in April 1986, which basically meant that EA handled distribution while Reality absorbed most of the actual publishing costs. Reality also had an endorsement deal in place with *Venture* magazine, which is why EA distributed the finished program under the name *Venture's Business Simulator*.

As EA and Reality were both private companies at the time, it's difficult to know how well *Business Simulator* sold. Reality itself went on to be a moderately successful company, mostly developing and licensing online investment software. In 1994, Goldstein and his partners sold the company to Reuters for $13.7 million.

Amnesia Proved a (Mostly) Forgettable Game

Thomas M. Disch's Amnesia was also a departure from the normal late 1980s EA fare. Although *Amnesia* was definitely a game, it was a text adventure, which EA had no prior experience publishing. Indeed, *Amnesia* would end up as the company's only foray into this market and was by some accounts the only Electronic Arts game released without a single on-screen graphic.

Amnesia did not start out at EA. The story behind this game has already been well documented by several others, including Jimmy Maher and Aaron A. Reed, so I'll try and keep this overview succinct.

The developer behind *Amnesia* was Cognetics Corporation, a company founded by Charlie Kreitzberg in 1982. Kreitzberg provided his own account of *Amnesia*'s creation in a 2019 interview with John Aycock, a computer science professor at the University of Calgary. Prior to Cognetics, Kreitzberg told Aycock that he'd worked as a programmer with the Educational Testing Service in New Jersey. With that background in standardized testing, Cognetics' first project was developing an SAT preparation program for Harcourt Brace Jovanovich. (Ironically, this was a different SAT prep program than the one George Morrow recommended.)

As it turned out, an editor that Kreitzberg worked with at Harcourt later moved to another publisher, Harper & Row, which was also looking to enter the test prep software market. This editor introduced Kreitzberg to Jane Irsay, who ran Harper's software unit. Irsay, in turn, introduced Kreitzberg to science fiction author Thomas M. Disch.

During the mid-1980s there was a brief period where a number of traditional book publishers, including Harper and Row, sought to publish Infocom-style text adventure games with prose written by traditional authors. Perhaps the most famous example of this so-called bookware was Douglas Addams' *The Hitchhiker's Guide to the Galaxy*, which Infocom itself released in 1984. Thomas M. Disch was, like Addams, an established author, though not as commercially successful. (Jimmy Maher described Disch's work as "uncompromisingly bleak," which I'm guessing contributed to that lack of success.) And Disch was apparently eager to try his hand at writing a text-based computer game.

It turned out that Kreitzberg was also interested in this market. A Cognetics programmer, James Terry, developed a Forth-based text adventure engine dubbed the "King Edward language." (Kreitzberg said the name came from a brand of cigars.) Disch then wrote a 450-page script for what became *Amnesia*, which Terry and another programmer, Kevin Bentley, then translated into the King Edward language.

As Kreitzberg recalled to Aycock, the development was quite difficult, as it was done entirely on an Apple II using 5.25-inch floppy disks and no hard drive:

> Compiling the game took more than a day. The computer ran so hot that we purchased a large fan and pointed it at the open case. Every time we did a compile, we prayed that the equipment would keep working long enough to get us to an executable.

Another challenge was that midway through development, Harper and Row decided it didn't want to be in the software business after all and abandoned *Amnesia*. It was at that point that a producer at Electronic Arts, Don Daglow, decided to pick up and publish the game.

Daglow gave his own account of *Amnesia* to Gunnar Lot of the German podcast *Stay Forever* in 2018. Daglow himself had a long history of developing computer games for 1970s mainframes and early video games for the Mattel Intellivision. After Mattel exited the market in the wake of the 1983-1984 video game crash, Daglow ended up at EA as a producer.

Daglow was, by his own admission, an enormous fan of Disch's literary work. So when he learned that *Amnesia* was in limbo, he signed a deal with Cognetics to have EA take over the publishing. Daglow said he faced some initial resistance from EA management over the proposed size of the game. Executing Disch's original script would have required shipping the game on six 5.25-inch floppy disks, Daglow told Lot. But EA never shipped a game with more than two disks, which Daglow conceded made financial sense given the size of the company at the time:

> [T]he EA that we're talking about then is not the EA we have now. All of our employees sat in a single office in San Mateo, California. I think when I joined EA, there were about 40+ people, maybe 43 people in Electronic Arts. When I signed [*Amnesia*], probably we had 65. We were not a big publisher that had a big bank account. Every game we published was a significant risk. And the price points we could charge were pretty well defined.

Even pared down to a 2-disk release, Daglow said *Amnesia* "did not do great" in terms of sales. For his part, Kreitzberg recalled the game "did moderately well" but admitted it "was not that blockbuster that we, Tom [Disch], and Electronic Arts hoped for." Again, I'm not aware of any exact EA sales figures from this period, but the company had several best-selling releases in 1986–such as *The Bard's Tale II* and *Starflight*–and *Amnesia* has never been considered in a class with those games.

Yet Wendy Woods' praise suggested this could have been a successful game. What went wrong? Kreitzberg and Baglow both cited the technological limitations of the time. Echoing Daglow's struggles to get the game on six disks, Kreitzberg acknowledged that Disch's script "was probably too sophisticated for the computers available." There was also the fact that the adventure game market had shifted away from pure text and towards graphically animated games like Sierra Online's *King's Quest*.

But *Amnesia* itself also quickly developed a reputation as something of a slog to play. Scorpia, the pen name for a well-known computer games reviewer of the time, wrote in the January-February 1987 issue of *Computer Gaming World* that *Amnesia* "begins with a fascinating premise, then falters in the execution of it." She cited the fact the game often forced you into a single path of decision-making in order for Disch's plot to reach its scripted conclusion. Then there were "further annoyances" created by what amounted to a primitive life simulator once the player got out of the starting hotel room and out onto the streets of Manhattan:

> Your character has an energy level, which tends to drop rapidly if you don't eat something. You can only move around a few hours (game time), before being warned that you need to rest. At that point, you must eat something soon (if you have the money), or nip back to the tenement and sleep awhile. The difficulty is that a reasonably healthy adult male should be able to go

> most of the day without having to eat something. You have to be pretty frail to collapse if you don't have your morning Wheaties. But that's what will happen eventually.

Wendy Woods mentioned the telephone book, subway map, and cross-streets code wheel that came with *Amnesia*. These too ended up being "further annoyances" for many players. Scorpia noted that you needed the telephone book to make calls from a payphone at 25 cents a pop–thus creating an additional need to earn money in the game by panhandling or performing other menial work. You also needed that money to ride the subway. As for the code wheel, that was simply copy protection, as Kreitzberg readily admitted in his interview with Aycock. And that wasn't a one-time thing. While on the streets in-game, the player would receive repeated requests to look up cross streets.

Daglow explained that Disch always intended for the player to spend most of the middle of the game struggling to survive in Manhattan. He said *Amnesia* was essentially a three-act game. The first and third acts were a "traditional text adventure," while he described the middle act as a "sandbox game." While Daglow pushed back at the suggestion from Gunnar Lot that this middle portion was "unfair," he admitted "we could have used three more months just to tune the thing, but we had to ship it." Kreitzberg himself said that if he had the game to do over again, he would "opt for a smaller world so we could go deeper rather than broader."

Incidentally, Daglow wasn't even around when EA finally shipped *Amnesia* in late 1986. He'd moved over to another company featured in this episode, Brøderbund Software, where he had a brief stint as an executive before starting his own company, Stormfront Studios, in 1988.

While *Amnesia* was little more than a footnote in EA's early history, neither Cognetics nor Disch ever developed another computer game. Disch continued writing as an author up until his death in 2008. As for Cognetics, it remained active until the early 2000s as a software design consulting firm. Kreitzberg told Aycock that he decided to "downsize" the company at the turn of the century and he later shifted into academia, taking a position at Princeton University.

One final note: *Amnesia* recently gained a second life in 2021 in the form of *Amnesia Restored*, a project led by a team of 32 students at Washington State University Vancouver's Creative Media & Digital Culture Program to "create an archival version of the game in open web languages." This *Restored* version is playable entirely in web browser and restores content from Disch's original script that had to be cut from the original EA release.

Toy Shop Probably Won More Awards Than Customers

Speaking of Brøderbund, *The Toy Shop* was a program that garnered strong praise from reviewers like Paul Schindler yet likely was not much more commercially successful than *Amnesia*. Once again, I acknowledge a lack of sales figures due to the fact Brøderbund was not a public company in 1986. But there are a couple of things that lead me to believe *Toy Shop* was not that popular with consumers. The first is that by the following Christmas season (1987), retailers had slashed the price of *Toy Shop* to as low as $17.99, a steep discount from the original $65 price in 1986.

The second indicator was that unlike its more successful sibling, *The Print Shop*, Brøderbund never released any expansion packs with additional model plans. *Print Shop* was such a big hit that many of its add-on clip art packs themselves became enormous bestsellers. Even a less well-known product like Brøderbund's *Science Kit*, which Stewart Cheifet recommended in the 1985 holiday buyer's guide episode of *Chronicles*, managed to crank out a couple of add-on modules. Yet aside from a box of additional card stock and crafting supplies, *Toy Shop* never saw any new content after its initial release.

The original idea for *Toy Shop* came from Jimmy Calhoun, who at the time was a Delta Air Lines pilot. According to a February 1987 article by Umberto Tosi for the *San Francisco Examiner*, Calhoun was a "model-building hobbyist" who had been improvising making his own components using *Print Shop*. This prompted him to approach Brøderbund with the idea of making a software package specifically targeting model builders. Although Calhoun formed his own company, Active Arts, to develop*Toy Shop*, Tosi said that Brøderbund handled all of the programming and testing internally.

Brøderbund chairman and co-founder Gary Carlston told Tosi that there was "some difficulty" in identifying a target market for *Toy Shop*. Eventually, the company decided it was really an "executive toy" for adults that "lets you show off something made with your computer." And while *Toy Shop* may not have broken any sales records, it did win awards. In fact, it was the single biggest winner at the 1987 Software Publishing Association awards, taking home three prizes for Best Creativity Program, Best Concept, and Best New Use of a Computer.

Notes from the Random Access File

- This episode is available at the Internet Archive and has an original broadcast date of December 5, 1986.
- Andrew Jong continued to own and run Winner's Circle Systems in Berkeley until his death in 2017 at the age of 69.
- The PC Type Right was developed by Michael Weiner, who worked at Xerox PARC before spinning off his own company, Microlytics Inc., which was best known for its thesaurus software*Word Finder*. According to a 2002 profile of Weiner by Smriti Jacob for the *Rochester Business Journal*, Microlytics primarily licensed its spell-checker technology to other companies like Sony and Microsoft. (I don't think the Type Right made much impact as a consumer product.) In 1990, Weiner sold Microlytics to SelecTronics, the makers of the digital address book that Stewart Cheifet showed George Morrow during the introduction to this episode.
- *Venture Business Simulator* was definitely a product released at the height of the Reagan administration. The in-game "memos" from company executives all used the names of Reagan cabinet members, such as Treasury Secretary James Baker and Defense Secretary Caspar Weinberger.
- 1 Step Software, the publisher of *Looking Your Best*, was a North Carolina-based software company that was active between 1983 and 1990. From what limited information I could find, aside from offering fashion advice, 1 Step mostly produced golf-related software.
- Edwin Rutsch, the author of *The IBM XT Clone Buyer's Guide*, was an unsuccessful candidate for the U.S. House of Representatives from California in 2022.
- IBM did run an ad during the 1987 Super Bowl for the PC Convertible that targeted college students, according to *Adland*. Apple apparently did not run a Super Bowl commercial that year–and it certainly did not release a PC compatible in 1987.
- There seems to be some confusion over who "invented" the code wheel as a means of software copy protection. Charlie Kreitzberg told John Aycock that Cognetics invented the wheel for *Amnesia*. But in a game developer forum published in *Computer Gaming World*–the same issue that featured Scorpia's review of *Amnesia*–Robert Woodhead of Sir-Tech Software commented that fellow participant Rod McConnell's company, Binary Systems, invented the

code wheel for their game *Starflight*. Both *Amnesia* and *Starflight* were published by Electronic Arts in 1986. But there was at least one other game, Infocom's *A Mind Forever Voyaging*, published in 1985, that featured a code wheel before either of the EA releases. (Special thanks to video game historian Kate Willaert and this 2013 post on the blog *Nerdly Pleasures* for helping to clarify this issue for me.)

Chapter 14: Lotus Express, re:Source, and Watson

Email is one of those technologies that has seemingly always been around in one form or another. The earliest electronic mail systems date back to the 1970s. But before the rise of the commercial Internet in the mid-1990s, the vast majority of computer users–to say nothing of the general population–had no access to email. There were several reasons for this, including the costs of additional hardware and email services, as well as the learning curve for using specialized communications software.

This next *Computer Chronicles* program, originally broadcast in December 1986, was all about the state of email as a product for consumers, businesses, and even nonprofit organizations. Jan Lewis of the Palo Alto Research Group made her debut in this episode as a co-host, filling in for the still-absent Gary Kildall. (No word where George Morrow wandered off to.) Cheifet began by showing Lewis *InBox*, a Macintosh-based electronic mail program that was used as part of an AppleTalk network. He showed how you could read and reply to a message using the Macintosh's graphical interface.

Cheifet joked that when PCs were first introduced, people said it would lead to a "paperless office," which never happened. Now, a lot of people were similarly promising that electronic mail would mean no more paper in the traditional office inbox. Did Lewis think that would ever happen? Lewis said that every new computer advance held the promise of the paperless office, but that was as likely to happen as the "paperless bathroom."

On the other hand, Lewis said that email would greatly speed up the effectiveness and productivity of communication. Taking Cheifet's sample email as an example, it probably took the sender 60 seconds to send him that message, and another 20 seconds for him to respond. That exchange would have taken longer by telephone.

Making Airplanes and Electronic Mail Systems

Wendy Woods presented her first remote report, narrating some B-roll footage taken at aerospace manufacturer and defense contractor McDonnell Douglas (which merged into Boeing in 1997). Woods said that computers were accused of all sorts of dehumanizing effects, maybe because of their inhuman way of communicating with people. On the other hand, computers were often the means to better human communication–especially over long distances.

In addition to airplane manufacturing, Woods noted that McDonnell Douglas was also a major supplier of communications networks both nationally and internationally. To exchange messages with its far-flung offices, the company used an electronic mail system called *OnTyme*. The system was available to anyone in the company with access to a terminal and a password. It provided each office with a secure way of transmitting data because the sender could address messages to as many or as few individuals as specified.

OnTyme was a "wide area network," Woods explained, designed to link distant terminals rather than adjacent offices. Users around the world could reach the mail system with just a local phone call. And sending a message to Europe took about as long as sending one down the street. Along with messages and files, *OnTyme* was also capable of transmitting graphics, such as a chart made with *Lotus 1-2-3*.

The appeal of international electronic mail, Woods said, was growing with more than 500 countries in 68 countries using the Tymnet communications network to transmit over 1 million messages per month. And if suppliers and countries could ever agree on a standard protocol to simplify access, the number of online users would only increase.

MCI, Lotus Teamed Up to Expand Email Offerings

Stuart Davidson and Jeffrey E. Anderholm joined Cheifet and Lewis for the first studio round table segment. Davidson worked in product marketing for MCI Mail, a commercial email provider. Anderholm was a product manager with Lotus Development Corporation, overseeing its *Lotus Express* product.

Lewis opened by asking Davidson, “What does email really do for the computer user?” Davidson said it provided a way to send messages and files that was much easier than existing methods, such as courier, post office, or fax. Cheifet followed up, asking how MCI Mail in particular was used and what a computer user needed to use the product. Davidson replied that with *Lotus Express*, you could put software on your IBM PC and use it to compose messages and send files to anybody on the MCI Mail network.

Cheifet asked if there was a monthly fee for this service. Davidson said yes, by purchasing *Lotus Express*, that product came bundled with a one-year registration fee that would set you up for an MCI Mail account. Thereafter the user would then pay a per-message charge for each message sent. Lewis clarified that there was no charge for simply sitting online without sending a message. Davidson said that was correct.

Cheifet turned to Anderholm and asked about *Lotus Express* and how it actually helped a person do email. Anderholm said *Express* was a PC communications package that worked with MCI Mail and let users send and receive messages, telexes, and files.

Anderholm showed a *Lotus 1-2-3* spreadsheet running on a PC. He explained that *Express* was running in the background to monitor his email. By typing `Alt-Shift-R`, he switched to *Express* as the active program. This brought up an incoming folder listing new messages. Anderholm noted that *Express* pulled these messages automatically from MCI Mail at specified intervals. He didn’t have to tell the program to dial the server to retrieve his messages. (Cheifet seemed impressed that *Express* could actually download email while you worked in *1-2-3*.)

Anderholm continued his demo, which was essentially explaining how to open and read an email message with a binary file attachment. In this case, the file was a *1-2-3* spreadsheet. To work with that spreadsheet, he pulled up a menu in *Express* and selected an option to save the file to the hard disk. Cheifet asked if you had to actually save the file before looking at it. Anderholm said yes, you had to save it so you could access it using *1-2-3*. He then switched back to the spreadsheet program and opened the file.

Cheifet clarified that *Express* was not a *1-2-3* add-on and that *Express* would work with any application. Anderholm said that was correct. You could transfer any PC file using *Express*, such as a *dBase III* or *WordStar* file. Cheifet asked if you could send a graph. Anderholm said you could send anything.

Cheifet asked Davidson about the security of email systems and “sending your private messages up there in space.” Was that a valid concern? Davidson said it shouldn’t be. Obviously, there were some issues that all PC users were familiar with when it came to the security of their machine. Within public email systems and networks, they were usually very secure thanks to password protection and the format in which the data was stored.

Cheifet said one complaint email users had was that it was not very easy to use and that online editing was a mess. Davidson agreed there were a lot of basic adoption problems tied to ease of use and functionality. *Lotus Express* made it very easy to send a message, send a file, receive a message, and receive a file, he said. It also took care of some of the convenience problems, like having a tone play when a message arrived. The program also checked email for the user so they didn’t have to remember to do it.

Lewis asked how often did *Express* check for email. Was the program online all the time? Did it check at intervals? Davidson said *Express* checked at user-specified intervals.

Cheifet asked about MCI Mail’s relationship with CompuServe. Davidson explained the two services had an interconnection agreement. This meant that CompuServe’s 300,000 subscribers could exchange emails with MCI Mail’s 100,000 subscribers. Even if the MCI Mail user was not a CompuServe subscriber, that MCI Mail subscriber could still send a message to a CompuServe user.

What about sending a message to someone who wasn't an MCI Mail user, Cheifet asked. Davidson said absolutely. There were a couple options. As previously noted, an MCI Mail user could send a message to someone who was on CompuServe. They could also send emails to someone on a private server within their own company. Or you could use a postal option, which would print out the message and send it by courier or postal service. If the recipient was overseas, you could also send the message to a telex terminal.

User-Friendly Email at The Source

Lloyd Kreuzer joined Cheifet and Lewis for the next segment. Kreuzer was president of Kreuzer Software–go figure–which developed *re:Source*, a mailbox program for users of The Source online service. Lewis asked Kreuzer what problems he was trying to solve with *re:Source*. Kreuzer said *re:Source* was a front-end for The Source that used the power of the IBM PC to make online communications easy for the user. The Source provided a number of electronic services, including email, access to airline schedules, news, a bulletin board of free software, and so forth. Having a front-end made it easier to access all of these services.

Cheifet asked for a demonstration of how *re:Source* could be used to make email more user friendly. Kreuzer walked through a "typical scenario" of opening an email, selecting the reply command, and using a full-screen editor to type that reply and attach a file. (In this case, Kreuzer imported a text file, which was then added to the reply email he was typing.) Kreuzer then saved his draft message, returned to the main menu, and selected his outbox. He then selected the message he just typed from the outbox screen and *re:Source* automatically dialed The Source and sent the message. The program would then also check for any new incoming messages.

Cheifet noted that everything Kreuzer just did was offline. Kreuzer said that was correct. Cheifet observed the advantage of this was that you weren't spending online charges while doing the composition and entering commands. He asked Kreuzer about the use of a word processor to write the message as opposed to a cumbersome online editor. Kreuzer said *re:Source* had a number of built-in features, including a "pop up" text editor. So you could write messages all day long and send them in one batch. You could also cut-and-paste items into messages.

Cheifet asked about retrieving incoming mail. Kreuzer said that as soon as *re:Source* completed sending any outgoing messages, a screen would come up and show any inbox messages.

Cheifet noted this program was specifically designed for The Source. Did Kreuzer see the same kind of user-friendly interface becoming available for other communications services? Kreuzer said yes. One of the things that was truly unique about his program was that the interfaces were based on a scripted programming language. This meant it would be very easy in the future to develop additional interfaces for other services. He added The Source would also be offering a new special interest group to make additional interfaces available for *re:Source* users.

Using Email to Connect the International Food Research Community

Wendy Woods presented her second remote segment, which focused on the international use of email. The opening shot was of the International Rice Research Institute, an agricultural research organization based in the Philippines. Woods said that to get a letter from any of 131 agricultural research stations in places as remote as Nairobi or the Philippines now just took an instant. They were all connected via an electronic mail system by Dialcom, an internationally accessible database.

Woods said that might sound simple, but it wasn’t. The network had to link local, national, and regional telephone systems. Problems ranged from poor transmission quality to government regulations. CGNET Services of Palo Alto, California, set up the Dialcom network, a job that took three years. And the job wasn’t done yet.

Georg Lindsey of CGNET Services told Woods that some of the places that you would think would be easy like Rome, for example, took a couple of years because they were embedded within a large organization that required approval for buying a modem.

But Woods said the main hurdle was not the hardware or the software but the people–specifically, getting them to use computers and modems. That job took Lindsey and his associates to nearly all the remote sites worldwide. CGNET provided all the equipment and the training necessary to operate it. This network–a low-cost, fast method of transferring large amounts of information–was now nearly complete. Lindsey said it had been incredibly successful and that email was now just a normal, accepted thing. And that in turn meant freeing up millions of dollars for research into growing more food and feeding more people.

Was "Talking Email" the Future of the PC?

Charles Foskett and Carl Berney joined Cheifet and Lewis for the final segment. Foskett was president of Natural MicroSystems. Berney, the vice president of Speech Plus, Inc., was a repeat guest, having appeared in a first-season episode on speech synthesis.

Lewis opened by telling Berney that she loved the idea of electronic mail. But suppose she was on the road and didn't have a computer with her. How could Berney's product, the CallText 5100, help her? (It should be noted Berney discussed an earlier version of the CallText in his first appearance.) Berney said the CallText allowed any caller from any telephone in the world to call a computer containing information in text form and have that information read back to them using synthesized speech.

Cheifet clarified that the information didn't have to be stored in any unusual way. Berney said yes, it was the same information that would otherwise appear on a terminal. Cheifet asked for a demo using a telephone in the studio. Berney called a CallText system that was in turn connected to an electronic mail system. The CallText then read back a message–in a synthesized voice similar to that of the late Stephen Hawking, who also used a CallText–to Berney from a *Computer Chronicles* staff member regarding today's taping. The message said the taping session would start at 1 p.m. and that Cheifet "manages the production schedule very efficiently, and will be sure to start on time."

Cheifet noted you could actually control the CallText system through the touch-tone telephone. Berney said yes, he could use the telephone keypad to have the system read back messages faster or spell out specific words, to give two examples. Cheifet then asked about voice recognition: How far were we away from being able to pick up a phone and call-in a message that would then be stored in ASCII in a computer. Berney said the capability to do speech-to-text over the telephone was still a little bit away, though the ability to recognize individual digits–i.e., touch-tone pad replacement–was close at hand.

Cheifet then turned to Foskett and asked about his two-way voicemail system, Watson. Foskett said that Watson was a voice-digitization system that collected voice and stored it on the computer disk for forwarding to another person. This could be done locally or over any telephone. He demonstrated a sample screen from Watson, which displayed a telephone contact book in a Rolodex-style card file. There was a search system to look for individual numbers. There were also separate files for outgoing and incoming messages. Foskett said the system basically provided a way of collecting voice information in the computer in sort of a “talking email” system.

Cheifet then used a telephone to dial the demo computer running Watson. The computer played a standard greeting message. Cheifet then entered a code and the system played back a message that Foskett left regarding today’s taping. Cheifet then left a reply message on the system for Foskett. Watson recorded that message, which Foskett could then access from his computer or by dialing in from another phone. Foskett said this sort of “talking email” system was of particular benefit to people who worked in sales who were often away from their desks and had to travel a lot. Cheifet noted that Watson was itself a plug-in card for the IBM PC. Foskett showed the actual card to end the program.

Commodore, Ex-CEO Locked in Legal Battle

Although the main episode was taped and initially aired in December 1986, the recording from the Internet Archive was from a rerun that was broadcast in June 1987. Susan Chase presented this “Random Access” segment, which was recorded on the latter date.

- Commodore International responded to a lawsuit brought by its former president and CEO, Thomas J. Rattigan, by filing an $18 million counterclaim alleging that he failed to carry out the decisions of the board of directors. Commodore alleged that Rattigan cost the company $15 million by importing the low-selling IBM-compatible PC-10, most of which had not been sold.
- In more positive Commodore news, software support for the company’s Amiga continued to grow. Chase said WordPerfect Corporation planned to ship an Amiga version of its best-selling word processor starting in July 1987, which would have all of the features of the existing PC version plus additional features to take advantage of the Amiga’s qualities. WordPerfect also planned to release updated versions for the Macintosh and Atari ST later in 1987.
- The Federal Communications Commission was considering a proposal to end free telephone access for online database systems. The Commission voted 4-0 to support a plan forcing packet-switching networks like Telnet and Tymnet to pay local telephone companies for access to their phone network. Industry analysts said the new fees, scheduled to begin on January 1, 1988, would substantially raise the cost of telecomputing.
- A California state legislative committee passed a proposed constitutional amendment that would expand the rights of freedom of expression and privacy protection to electronic communications and databases. Chase said the bill still needed to go through a round of ratification votes in the legislature before being submitted to the voters in 1988. She added the proposal was backed by the American Civil Liberties Union and computer bulletin board system operators. (From what I can tell, this proposal never made it to the ballot.)
- Paul Schindler reviewed *TMPC* (Acroatix Corporation, $50), a “simple yet effective time management program” for the TRS-80 Model 100 portable computer. The program included an appointment book and to-do list.
- The Associated Press unveiled a new method of digitally transmitting pictures and graphics to its subscribers via satellite. Chase said the new

GraphicsNet system was slated to start in the fall of 1987 and would deliver camera-ready artwork directly into a Macintosh computer. And beginning in 1988, subscribers to the AP's Photostream photo system would be able to receive a black-and-white picture in one minute and a color picture in three minutes.
- Emergency room doctors, ambulance drivers, and trauma center personnel would soon be able to access a patient's medical background almost instantly due to a new computer-based service recently introduced by Los Angeles-based Med-Fax Corporation. Chase said that for a $35 fee, medical personnel could phone a Med-Fax computer, enter the patient's ID number, and receive a voice-synthesized message with the patient's medical and emergency contact information.

MCI's "Metered" Email Model Failed to Survive Internet Transition

You wouldn't necessarily get this from watching the episode, but consumer email services were still very much a niche business in late 1986. In March 1987, a newsletter called *Electronic Mail & Micro Systems* released a survey of email use. It found that CompuServe was the largest consumer-oriented email service in terms of number of mailboxes–300,000 total–while The Source had just 65,000 subscribers but reported the highest amount of traffic with 1.4 million messages sent each month. To put that in comical perspective, there were an estimated 319,600,000,000 emails sent *each day* in 2021, according to Statista. And the largest email provider, Google's Gmail, currently has about 1.8 billion active users, according to SaaS Scout.

Of course, one major difference between today's email services and those of the 1980s was that services today are fully interconnected. That is, you can send and receive messages between different email providers without any friction. That was not the case when this *Chronicles* episode aired. As Steve Bosak noted in an April 1986 feature for the *Chicago Tribune*, there were a plethora of companies that had jumped into the electronic mail business, including AT&T, Dialcom, General Electric, GTE, McDonnell Douglas (which Wendy Woods profiled), Western Union, Dow Jones, and of course CompuServe and The Source. But for the most part "subscribers to one mail service are virtually locked out from the others." Even the MCI Mail-CompuServe inter-service connection discussed in the episode was limited. Bosak said that MCI Mail only offered the ability to email CompuServe users to its corporate customers. Individual "hobbyist" account holders were still limited to only communicating with other users within the MCI network.

MCI was, at the time, not the biggest business email provider. It ranked third behind Western Union and US Sprint, according to the *Electronic Mail* survey. But MCI was one of the first companies to promote email as a standalone service for business customers. Founded as Microwave Communications, Inc., in 1963, venture capitalist William G. McGowan took over as chairman in 1968 and reorganized the company into MCI Communications Corporation, which led the successful antitrust fight to break up AT&T's long-distance telephone monopoly.

Benjamin Schwantes explained in a 2014 paper that while email had been around since the 1970s, it had "largely been the realm of computer scientists and academics, hobbyists with access to dial-up bulletin board systems (BBS), and a small number of corporate intranet users utilizing systems such as IBM's PROFS." The first two business email services to emerge were GTE's Telnet and Western Union's EasyLink. Such "pure" email services were not popular with early 1980s consumers, however, who still wanted physical delivery of certain letters and documents.

Schwantes explained that MCI's plan was to leverage its long-distance telephone network to make both electronic-only and hybrid delivery services available to home and business customers:

> In order to develop their new system, MCI officials turned to two firms with experience in computer networking and software development, Digital Equipment Corporation (DEC) and BBN, and an individual with extensive first-hand knowledge of data networking to lead the team effort, Vinton Cerf. Together, DEC, BBN, and Cerf created a unique electronic mail platform that helped to popularize electronic mail among individual computer users and within the broader small

> and medium-sized business community. However, the metered-service model that the firm adopted failed to become the standard paradigm due to growing competition from alternate email service providers and the growing popularity of Internet-based messaging in the 1990s.

William McGowan formally announced the launch of MCI Mail in September 1983. An early advertising blitz touted the $40 million electronic mail service as "[t]he Nation's new postal system." MCI Mail would let you send to anyone, anywhere, "[r]egardless of the kind of equipment they have." So an Apple user could communicate with someone using a Wang computer. And even if the recipient didn't have a computer, MCI Mail would still deliver the message in hard copy.

As Schwantes noted, MCI Mail used a "metered service" model. Jim Seymour, writing about MCI Mail in 1986, explained that the service itself cost $18 per year. The long-distance connection time to send and receive messages was 5 cents per minute. Sending an "under-750-character" reply to a message cost 45 cents. Longer replies cost $1 for every 7,500 characters, or about three typed pages. And having MCI Mail print out and deliver a paper copy cost an additional $1. And you also had to factor in the costs of buying special communications software and a modem, which Seymour estimated could run you about another $350 to $600.

Given the expense, it's perhaps not surprising that MCI Mail failed to meet its early projections in terms of customers and message volume. Schwantes said that after its first year, MCI Mail only had 35,000 "voluntary subscribers." (Another 65,000 were "enrolled automatically" by using an online database partnered with MCI.) And out of those 35,000, only about 12,000 used the email service regularly, generating about $500 per person in revenue.

By April 1986, MCI had folded the MCI Mail unit into its main sales organization, according to Michael Schrage of the *Washington Post*. One analyst told Schrage that while electronic mail would "eventually become a billion-dollar industry," adoption was still slow because email was "still difficult to use" and "involves a cultural change."

Lotus Express was an attempt at changing that culture. It was an effort to specifically promote adoption of MCI Mail by taking advantage of the existing customer base for *Lotus 1-2-3*. Indeed, while MCI Mail claimed to have about 100,000 subscribers in late 1986, there were nearly 2 million copies of *1-2-3* sold. Martin Levine, writing for Long Island's *Newsday* in December 1986, said *Express* retailed for $100 plus $1 per transaction, with the revenues split between MCI and Lotus Development.

MCI Mail took a much more significant step, however, when it joined the Internet in 1989. According to Peter Geiger of the *Akron Beacon-Journal*, two computer scientists at The Ohio State University played a key role in making that connection, which enabled both MCI Mail and CompuServe users to exchange messages with "more than 1,000 independent electronically connected networks."

The Internet helped MCI Mail stay afloat. But it also spelled its ultimate doom. By the 1990s, new companies had entered the market for providing email accounts using the Internet, and MCI Mail's metered connection model quickly fell out of favor. As Benjamin Schwantes noted, after MCI merged with WorldCom in 1997, the combined company "devoted less attention to their increasing anachronistic product and eventually decommissioned MCI Mail in 2003 during the fallout from the WorldCom bankruptcy."

Notes from the Random Access File

- This episode is available at the Internet Archive and was recorded on December 6, 1986. As noted above, however, the Archive's version of this episode is a rerun dated June 18, 1987.
- Stuart Davidson shifted his career from marketing email systems to promoting cutting-edge biotechnology. In the late 1980s, he joined Alkermes Inc., a biomedical research company, as its president. Davidson later founded and served as CEO of Combion, Inc., a company spawned out of the California Institute of Technology that invented a device to analyze human genes. Combion went public and was sold to Incyte Pharmaceuticals Inc. in 1996 for $3 million in stock. Since then, Davidson has been living the venture capitalist life,

notably as co-founder, chairman, and managing director of Sonen Capital in San Francisco.

- Jeffrey Anderholm left Lotus in 1996 to join Fidelity Investments, where he served as vice president of electronic marketing for a short time. He followed that up with a stint at a Boston-area e-commerce company before joining Davox Corporation in January 1999 as vice president of marketing. Davox primarily developed software for telephone call centers. Anderholm quickly worked his way up to executive vice president for products. But it appears from SEC filings that Anderholm left Davox in 2002 after the company acquired Cellit Technologies and renamed itself Concerto Software Inc. I could not locate any record of Anderholm's employment or activities since then.
- Lloyd Kreuzer is actually a physicist, having earned his PhD from Princeton University in 1966. While working at Bell Labs in the early 1970s, he designed a device to analyze air pollution using a computer. Kreuzer left Bell to commercially develop the device through his own startup, Diax Corporation, which only lasted a couple of years. He later joined Hewlett-Packard Labs and rose to be a vice president of advanced development before leaving in 1981. Kreuzer had a couple of different startups during the 1980s, Menlo Corporation and the aforementioned Kreuzer Software, neither of which lasted long. After the end of his brief foray into email software, Kreuzer joined Acuson Corporation, a manufacturer of ultrasound imaging equipment, as director of business development. He held that position until 2003, during which time German conglomerate Siemens acquired Acuson in 2000 for $700 million in cash. In 2006, Kreuzer started his current company, Imorgon Medical LLC, where he continues to develop ultrasound technology.
- I'm not sure Kreuzer's *re:Source* ever made it to market. I did find some newspaper advertising by The Source touting the new front-end service for a January 1987 launch. But in April 1987, the Reader's Digest Association sold The Source to a private venture capital firm, Welsh, Carson, Anderson & Stowe. Two years later, in June 1989, Welsh sold off The Source to CompuServe, which shut the service down that August.
- CGNET is still around today with Georg Lindsey as its CEO. Like Lloyd Kreuzer, Lindsey worked at Bell Labs before striking out on his

own. He co-founded CGNET in 1983 to create the email network described in Wendy Woods' report. CGNET has continued to manage and expand its network ever since, today supporting 30,000 users representing 200 organizations in 130 countries.

- Charles Foskett and three others co-founded Natural MicroSystems Corporation in 1983 to market Watson, which was basically an early PBX system. Foskett told the *Boston Globe* in September 1985 that the $700 Watson system sold about $2 million in units during its first year on the market. Natural MicrSsystems continued refining and selling Watson well into the early 1990s. By 1997, the company's sales reached about $75 million annually. Robert Schechter, who took over from Foskett as the company's president in 1995, decided to pivot from selling to business customers to supplying telecommunications gear to larger networking companies. By March 2000, the plan seemed to be working as Natural MicroSystems' stock price reached $76.25 a share. But the collapse of the dot-com bubble brought that down to just $9.82 the following January. The company–renamed NMS Communications in 2002–still managed to chug along until the Great Recession of 2008. In September 2008, NMS sold its telecommunications business to its main competitor, Dialogic Corporation, for $28 million. NMS then renamed itself again–this time after its surviving business, LiveWire Mobile, which primarily marketed ring tones for cell phones. In 2003, India-based OnMobile acquired LiveWire for $17.8 million. As for Foskett, since 2000 he's served as CEO of RailRunner N.A., Inc., a provider of bi-modal transportation technology.
- Thomas J. Rattigan was the second CEO brought in to revive Commodore following founder Jack Tramiel's resignation in 1984. The first, Marshall Smith, was a steel industry veteran with no experience in computers and technology. Smith brought in Rattigan, a Pepsico executive who also had no computer industry experience, to run the company's business machines division. (Hey, it worked for Apple!) Rattigan quickly rose to become president and chief operating officer before replacing Smith as CEO in March 1986. But like Tramiel, Rattigan clashed with Commodore chairman and controlling shareholder Irving Gould, leading to Rattigan's sudden dismissal in April 1987, only a year into his five-year contract. Rattigan went on to

win a jury verdict against Commodore for breach of that contract in 1991. Oddly, the trial featured two men best-known for serving as cabinet members to Republican presidents. Michael Mukasey, who served as attorney general of the United States under President George W. Bush, was the federal judge who presided over the trial. And one of the witnesses was former White House chief of Staff and Secretary of State Alexander Haig, who was a member of Commodore’s board.
- In the cold open for this episode, Stewart Cheifet demonstrated a GRiD Systems Compass II laptop, which he noted could send an electronic mail wirelessly “through radio waves.” Spooky.

Chapter 15: The Compaq Deskpro 386, Zenith Z-386, and VP/ix

The star of the November 1986 COMDEX show was the Intel 80386 microprocessor. As I discussed in my post about the *Chronicles* episode covering that event, Compaq and Zenith were among the first companies to announce their own 386-based PCs. This allowed these "clone" makers to get the jump on IBM, which was continuing to drag its feet on its own next-generation PC, the PS/2, which would not come out until August 1987. And even when the PS/2 was released, IBM opted to continue using older Intel 8086 and 80286 microprocessors, with the first 386-based PS/2 models not making it onto the market until 1992.

Of course, as we head towards the end of 1986, the 386 was still a high-end chip meant for high-end systems. Neither Compaq nor Zenith's new offerings were cheap. And there was not yet much in the way of specialized software or even operating systems that could take full advantage of the 386's capabilities. That would be the main focus of this next *Computer Chronicles* episode from December 1986, which focused on the speed of the 386 while also looking at what these new machines could actually do for consumers.

Jan Lewis was back for her second consecutive episode as substitute co-host. Cheifet opened the program by showing Lewis an actual Intel 80386 microprocessor, noting "this is what all the fuss is about." He added that there was no real operating system or software available for the new processor, yet people were waiting in line to buy computers with a 386 in it. Indeed, there had been more talk about the 386 than probably anything since the original IBM PC came out six years earlier. Was this just hype or was it a major development in personal computers? Lewis said it wasn't just hype–the 386 was a "quantum leap" in personal computers. People were standing in line for 386 systems just for the raw speed that it offered for applications such as graphics, telecommunications, and computer-aided design. But the real promise of the chip was in the applications that would be coming down the road in the next 2 to 5 years.

Kildall Saw 386 as Next Step in Software Development

Wendy Woods presented her first remote segment, which oddly enough profiled regular *Chronicles* co-host Gary Kildall’s company, KnowledgeSet Corporation, based in Monterey, California. Woods said that very few hardware introductions had received as much attention at Intel’s new 386 microprocessor. The fast 32-bit chip was already available in a number of desktop machines at prices that definitely put it into the microcomputer category.

Woods said that KnowledgeSet recently purchased a 386 micro to assist their CD-ROM software developers. So far, the machine ran compilation tests about three times faster than the (286-based) IBM PC-AT and equally shined in calculation-intensive graphics displays. Kildall told Woods that the 386 machine was important in a development environment because it let them get through programming tasks a lot faster than before. Where before they would have used something like a single Digital Equipment VAX computer for program development, they could now have each engineer use a 386 machine. This also meant you didn’t need the more elaborate fire extinguisher systems or a specially air-conditioned computer room, which also cut down on the expense of the operation.

Closing the gap between minicomputers like the VAX and microcomputers was certain to affect prices, Woods said, and likely to give a boost to the development of new applications. Kildall added that the reason for this was not so much because of the 386 but rather the fact that the technology was now readily accessible to a large number of people. For example, you could conceivably build a commercial expert system using a 386.

Woods noted that in spite of all the publicity surrounding the 386, 32-bit chips were not new technology. But developers saw special promise in this new round of 32-bit 386 machines. Kildall said the interesting thing was that the 386 grew out of the IBM PC world and it wasn’t just the chip that was important but that it was now considered the next stage to move to. This also meant that the basic underlying functionality had to be improved considerably.

How Fast Could You Run a Lotus Macro?

In the first studio segment Michael Swavely, the vice president of marketing with Compaq, joined Cheifet and Lewis to discuss his company's new machine, the Deskpro 386. (Another Compaq employee was present to assist in the demonstration. I think Cheifet said his name was "Len Parsons," although he was never identified on-screen.) Lewis opened by asking Swavely who was actually buying the Deskpro and what they were using them for. Swavely said the Deskpro had been selling well among a whole range of customers. Most of these customers were looking for the power and performance that the 386 brought to their applications, such as very large spreadsheets, large databases, as well as more specialized applications such as computer-aided design, network file services, or even small multi-user systems running the XENIX operating system.

Cheifet asked Swavely to demonstrate the Deskpro 386's speed by running a "very complex macro" on a spreadsheet. Swavely explained this was a 5,000-cell spreadsheet running in *Lotus 1-2-3*. It took the 386 about 16 seconds to run the entire macro, which involved recalculating and refilling the cells in the spreadsheet.

For comparison, Cheifet asked Parsons to set up and run the exact same macro with the Deskpro in 8088-mode, which restricted the machine's clock speed to 4.77 MHz, the same as the original IBM PC. (The 386 in the Deskpro ran at 16 MHz at full speed.) While that ran, Lewis asked if the speed of the 386 rendered the AT and the 286 obsolete. Swavely said he didn't think so. There was still a significant price difference for the added performance of the 386. So both the 286 and 386 products would have a place in the market for several years.

Cheifet asked about compatibility. Would all existing software run on the 386? Swavely said yes, Compaq was staking its reputation on the compatibility of the Deskpro 386.

Cheifet noted that some users were worried that “any day” now IBM would announce its own 386 machine and it was gutsy for Compaq to go first. How risky a move was it for Compaq? Swavely said he didn’t think it was a risk at all. Compaq believed the industry standard that had been established for business software was clearly in place. The Deskpro 386 innovated within that existing standard as opposed to trying to go outside the standard and do something different. IBM may or may not enter the 386 marketplace in the future and the market would judge them the same as any other manufacturer.

Cheifet followed up, clarifying that Compaq wasn’t worried about IBM creating a slightly different standard. Swavely said not particularly, because IBM had to live within market realities. And that reality was that American business had made an enormous investment in the industry standard. Cheifet quipped that IBM may have “buried itself” in that standard.

Meanwhile, the demonstration macro was still running in 8088 mode. As the waiting continued, Cheifet asked when we would actually start to see new applications for the 386. Swavely said the Deskpro 386’s launch had kickstarted new development, and right now there were hundreds of companies in the industry working on new hardware and software capabilities seeking to take full advantage of the 386 architecture.

As Swavely continued his response, the Deskpro beeped to indicate it had finally finished running the macro in the slower mode. Cheifet said the final time was 2 minutes and 17 seconds, as compared to the 16 seconds it took the machine in full 386 mode.

Sun Betting on Good NeWS

Wendy Woods presented her second remote report from Sun Microsystems. (This was Wendy’s second visit to Sun, having previously profiled the company in a February 1985 episode focusing on UNIX.) She opened on an image of several programs running at once on a 386-based PC. Woods said this was accomplished using a programming tool called *NeWS* from Sun. Previously, this product was only available on Sun workstations.

So why was *NeWS* news? Woods said that Sun was betting the 386 would become as pervasive at the chip that runs today. By getting to market first with a windowing product that could be adapted to many machines, Sun hoped to make *NeWS* the new windowing standard for UNIX. Dr. Eric Schmidt of Sun told Woods that if you looked at areas like computer-aided design and publishing, the 386 would be a major player in those markets. And he believed that *NeWS* would be a key component. In addition, customers who had Sun machines could run the same applications on a 386 machine using *NeWS*. So that also made it attractive for Sun to license *NeWS* to the 386 community.

Woods said that *NeWS* was also unique in that it was partially constructed with *PostScript*, a sophisticated imaging model that enabled a user to manipulate the size and scale of each window. She added that while time would tell if the 386 would be successful, there were at least two dozen software companies–many of them big names–using *NeWS* to write their own 386 applications.

Zenith Not Worried About IBM’s Next Move

Bob Dilworth, the president of Zenith Data Systems, joined Cheifet and Lewis for the next studio segment. Dilworth was there to talk about his company’s new offering, the Zenith Z-386. (There was once again a silent system operator to assist with the demo, but I could not make out his name.)

Lewis asked Dilworth how the Zenith machine differed from the Compaq Deskpro 386? Dilworth said the machines had similar features and both companies had to design without knowing what the other was doing. Obviously, both companies were interested in trying to protect standards. But he said Zenith’s approach was unique with respect to handling memory. But the Deskpro and Z-386 were both very fast MS-DOS machines.

Cheifet asked if the Z-386 was out now. Dilworth said it was. Zenith was shipping systems to existing customers. Lewis then repeated her earlier question to Swavely, asking Dilworth who was buying these machines and what they were using them for. Dilworth said that generally speaking it was people who needed the speed or lots of memory access, such as users handling large database files.

Cheifet asked if there was a real market for the 386 based on speed alone or would it depend on new, more sophisticated applications to move machines like the Z-386. Dilworth said that obviously new applications would drive the market. But there were currently sophisticated applications running sluggishly on even a 286 machine. So those users still needed a 386 to run their existing software more quickly.

A demonstration of the Z-386 followed. The operator loaded a 10-page *WordStar* document that was previously prepared by the *Chronicles* staff. Cheifet explained the document contained the same error 90 times. He asked to see how fast it took to perform a search-and-replace to correct those errors. Dilworth commented this operation was about three to four times faster on the Z-386 versus a 286 machine.

Cheifet again raised the question of what IBM would do. Dilworth said he wasn’t sure. He read the same press as everyone else. He expected IBM to eventually use the 80386 in some fashion, but he didn’t know when.

Cheifet asked about the consequences for users when new 386-specific applications came along. What would this actually mean for business users? Dilworth said that it was software–not hardware–that drove the market. In this particular case, he expected to see more easy-to-use software packages that required the power and speed of a 386 to work.

Running UNIX and DOS Together on a 386

Dana Krelle and Neil Colvin joined Cheifet and Lewis for the final segment. Krelle was the marketing manager for the 80386 microprocessor at Intel. Colvin was chairman and CEO of Phoenix Technologies.

Lewis opened by asking Krelle for some background on the 386 and “why all the fuss?” Krelle said the 386 was the 32-bit generation of the 8086 technology, which was also the basis for the 8088 and 80286. The 80386 not only offered compatibility with those previous-generation processors, it also represented a performance increment over the prior machines. The 386 also offered a richer architecture for software developers.

Cheifet asked about operating systems for the 386. Krelle said that UNIX System V, Release 3, had already been ported to the 386 and was now in beta at over 50 different original equipment manufacturers (OEMs) who were developing products. Krelle added that AT&T, which owned UNIX, should begin certifying some of these systems by early 1987. Additionally, several OEMs were developing products that surrounded the 386 and UNIX. A number of companies, including Phoenix Technologies, had also built tools to use MS-DOS on top of UNIX on the 386. He also pointed to Sun Microsystems' *NeWS*. So at least in the workstation environment, the software market for the 386 was already very well developed.

Cheifet turned to Colvin and asked about his company's product *VP/ix*. Colvin picked up on Krelle's earlier point and explained that *VP/ix* was an integration of the UNIX environment for the 386 and the PC-DOS (i.e., MS-DOS) environment used on existing systems. It allowed you to run any PC task under UNIX as a UNIX task.

What was the advantage of doing that, Cheifet asked. Colvin said it gave you the best of both worlds. You could run your UNIX jobs, such as computer-aided design, and then at the same time switch to running popular DOS applications like *Lotus 1-2-3* or *dBASE III*.

Cheifet asked Colvin to demonstrate *VP/ix*. Colvin explained there were two terminals on the desk to illustrate the multi user capabilities of UNIX. The terminals were linked to a 386 machine over an RS-232 serial connection. Colvin ran a standard UNIX command on one terminal. On the other terminal, he started a "virtual PC" using *VP/ix*. He said you could also "nest" these environments, such as running *Microsoft Windows* on the virtual PC, which he did. He then started a second DOS virtual machine on the other terminal to run *1-2-3*.

Turning back to Krelle, Cheifet asked about the different "modes" used with the 386, such as virtual and protected modes. Krelle said there was only one mode in the processor that everyone was using, the protected mode. The ability to run a virtual machine within the 386 was all contained within the protected mode. The “protected mode,” in turn, referred to the full 32-bit architecture of the machine. Lewis clarified this meant that an application could not “clobber” the operating system. Krelle said that was correct. One reason that Intel called it “protected mode” was that there were several intrinsic features in the 80386 chip that allowed protection not only of the operating system from an application, but also from one application hurting another application, and even protection within an application so it couldn’t do “wrong things” to a machine.

Cheifet asked about the future of the 386. What would it mean for users once new applications were available? Krelle said it would mean that the applications available over the next couple of years would be much more powerful. He expected many of those new applications would incorporate artificial intelligence techniques to allow the machine to be molded to the user rather than vice versa.

AI Stocks Were Down as 1986 Closed

Stewart Cheifet presented this week’s “Random Access,” which was recorded in December 1986.

- The year-end IBM rumors included reports that Big Blue would come out with a new low-end PC aimed at the education market, a new “souped up” 286 machine, and a new 386-based computer. Meanwhile, Cheifet said IBM had called it quits on the original PC, with sources claiming that production of the machine had stopped, despite the fact it still accounted for 7 percent of all personal computer sales.
- Despite predictions that 1986 would be the “Year of ~~Linux on the Desktop~~ Artificial Intelligence,” the stock prices of AI companies fell to a three-year low at the end of the year, down an average of 26 percent from a year ago. Cheifet noted that one big factor in the future of AI applications would be the role of the U.S. Department of Defense, which up until now had been a major supporter of artificial intelligence research, particularly to support the Strategic Defense Initiative.
- A study published by New Jersey’s Rider College found that students who used computers and word processors received better grades on

papers than did students on typewriters. Cheifet said that of the 200 papers reviewed for the study, no student who used a word processor failed and 76 percent of the papers done on computers were women.
- Montana’s legislature announced a new online database that would list all pending bills, the names of sponsors, the schedules for committee hearings, and the status of bills. Cheifet said it would cost users a $100 flat fee for unlimited access to the system.
- Lee Foster, a California-based travel writer, came out with what Cheifet said might be the first complete book distributed exclusively on a floppy disk. Foster’s *West Coast Travel California* sold for $19.95.
- A computer researcher at Bell Labs analyzed Leonardo DaVinci’s famous Mona Lisa painting and a sketch of the artist himself and concluded that based on a comparison of the facial structure, DaVinci was the model for the painting.

Compaq’s Deskpro an Early Platform for UNIX Expansion in the PC World

It’s interesting that neither Stewart Cheifet nor Jan Lewis asked about the prices of the 386 machines demonstrated in this episode. This likely belied the fact these were not computers for the typical consumer tuning into *Computer Chronicles* on a Saturday afternoon. Indeed, as Wendy Woods’ remote segments made clear, the 386 was initially seen by many in the industry as a means of replacing minicomputers with equally (or more) powerful individual workstations that typically relied on UNIX rather than MS-DOS.

So exactly how much was a 386? Well, according to an extensive review in the November 25, 1986, issue of *PC Magazine*, Compaq’s base model for the Deskpro 386, the Model 40, started at $6,499. This configuration included 1 MB of RAM, a 1.2 MB floppy disk drive, and a 40 MB hard disk drive. Some optional extras included a second 40 MB hard disk for $2,199, a 4 MB RAM expansion board for $2,999, and an Intel 80387 math coprocessor for $349. (The Zenith Z-386 base model had an identical configuration and, I’m guessing, a similar price.)

The Deskpro was designed to operate under MS-DOS 3.1 and Xenix. Xenix was a UNIX-based operating system that Microsoft originally developed under a license from AT&T. Microsoft did not sell Xenix directly to consumers but instead subcontracted most of the development and support to the Santa Cruz Operation (SCO), which later took over the Xenix project outright. *PC Magazine* reported in November 1986 that SCO had already shipped a development toolkit for a 386 port of Xenix, which ended up being released in 1987. SCO also distributed *VP/ix*, which cost $495 for a one- or two-user license or $995 for three or more users.

In the *Chronicles* episode, Neil Colvin presented *VP/ix* on behalf of his company, Phoenix Technologies. Phoenix actually marketed the software as part of a joint venture with Interactive Systems Corporation (ISC). Founded in 1977, ISC was one of the first third-party vendors to obtain a commercial UNIX license from AT&T. ISC created its own UNIX variant, PC/IX, which competed against Xenix. In 1984, IBM decided to start selling PC/IX directly to users of the PC/XT, possibly in an effort to minimize Microsoft's growing dominance of the operating system market.

ISC subsequently released 386/IX–with *VP/ix* as an add-on module–to take advantage of the new Intel 386 architecture. In March 1988, Eastman Kodak purchased ISC and continued distributing 386/ix and *VP/ix* under its new Interactive Systems Products Division. But three years later, in September 1991, Kodak decided to sell the entire division to Sun Microsystems, which merged it into its existing SunSoft subsidiary. Sun released a final version of what was now known as Interactive UNIX in 1998.

Colvin Rose from the Ashes of Phoenix's Stock Price to Rebuild Local Theater Company

Unlike ISC, Phoenix Technologies is still in business. Founded by Neil Colvin in 1979, Phoenix made its name by reverse engineering the BIOS software used in the original IBM PC and selling it to clonemakers. Phoenix carefully documented its "clean room" process to protect against a possible copyright infringement lawsuit from IBM, according to a July 1984 report by James Langdell for *PC Magazine*:

> One group at Phoenix examined the BIOS software documents in IBM's *Technical Reference* manual, and wrote a set of specifications that described how the program functioned without including any examples of actual code. This description was passed on to a single programmer who tried to write code that fulfilled its specifications. Whenever Phoenix found parts of this new BIOS that didn't work like IBM, the isolated programmer would be given written descriptions of the problems, but not any coded solutions that might have hinted at IBM's original version of the software.

Boosted by this and other early successes, Colvin took Phoenix public in 1988. But as Phoenix's post-IPO stock price plummeted and financial losses mounted, the company went through some UK-style management turnover. Covlin stepped aside as CEO in mid-1988 but remained the company's chairman. Lance Hansche, the company's executive vice president, then took over as CEO for six weeks until he was replaced by Ted Joseph as acting president and CEO. More than a year later, in December 1989, Phoenix announced Ronald Fisher as its new president and CEO. Ironically, Fisher had held those same posts at the aforementioned Interactive Systems Corporation. (Fisher told the *New York Times* he was looking forward to moving back to the east coast, as Phoenix was based in Massachusetts.)

Ten days after Fisher officially took the reins, Colvin announced he was stepping down as Phoenix's chairman. Colvin told the *Boston Globe* that he hoped "to use the chairman's title as an incentive to woo high-caliber candidates for the board." Although Colvin indicated he would still remain with Phoenix in some capacity, there's not much record of his activities in the tech industry after 1990.

In 1993, Colvin funded the rehabilitation of the Orpheum Theater in Foxborough, Massachusetts. The *Globe* reported at the time that Colvin had long been active in promoting live theater, and he was then serving as president of the Foxborough Regional Center for the Performing Arts. The Center and the Orpheum remain active today, having renamed itself the Marilyn Rodman Performing Arts Center in 2017.

As for Phoenix Technologies, it regained its footing under Fisher and his successors and continued to primarily develop and sell BIOS software and related computer firmware. In August 2010, Marlin Equity Partners of Los Angeles acquired Phoenix's outstanding stock for $139 million and took the company private. In January 2021, a newly formed group called Sentara Limited and led by Gerard Moore purchased Phoenix Technologies in what was described as a "friendly acquisition." Moore is currently Phoenix's CEO and Sentara's major shareholder.

Notes from the Random Access File

- This episode is available at the Internet Archive and has an original broadcast date of December 23, 1986. It was likely recorded on December 6, 1986.
- Michael Swavely joined Compaq a few months after its 1982 founding. He served as vice president of marketing when this episode first aired in 1986. Compaq promoted Swavely to president of North American operations in May 1989. He announced a six-month "personal sabbatical" from Compaq in January 1991, which turned out to be permanent. The company announced Swavely's retirement on July 11, 1991. Ten years later, in 2001, Swavely and another former Compaq executive, Gary Stimac, purchased Texas-based server company RocketLogix and renamed it RLX Technologies. With Swavely as CEO, RLX initially marketed low-cost servers to web-hosting companies. But the dot-com bust put an abrupt end to that plan. After burning through $30 million in funding, new management took over from Swavely and kept RLX going until November 2005, when Hewlett-Packard purchased the company from two venture capital firms.
- Eric Schmidt is best known today as the former CEO and later executive chairman at Google (now Alphabet, Inc.) between 2001 and 2020. Schmidt earned his PhD in electrical engineering and computer science from the University of California, Berkeley, in 1982, and joined Sun Microsystems the following year. During his 14-year stint with Sun, Schmidt rose to become president of the company's Sun Technology Enterprises subsidiary. In 1997, Schmidt left Sun to become chairman and CEO of Novell, Inc., a post he held until joining

Google. While at Google, Schmidt participated in an illegal scheme with then-Apple CEO Steve Jobs and several other tech companies not to recruit each other's employees. (Schmidt also served on Apple's board for several years.) After retiring from Google, Schmidt and his wife started Schmidt Futures, which funds a variety of research grants.

- Robert Dilworth died in September 2017 due to pancreatic cancer. Born in 1941, Dilworth was an executive with Varian Associates, Sperry Corporation, and Ultra Magnetics before joining George Morrow's company, Morrow Designs, as president in 1982. Dilworth abruptly left Morrow in July 1985 to become president of Zenith Data Systems. As I discussed in my prior post about Morrow Designs, the Dilworth-led Zenith won a key contract to provide laptop computers to the Internal Revenue Services based on a design licensed from Morrow. Morrow Designs received no per-unit royalties from the deal, however, and after that company filed for bankruptcy in March 1986, Dilworth's Zenith subsequently acquired all of Morrow Designs' intellectual property rights. Dilworth left Zenith in August 1987 to join a startup company, Metricom, Inc., which developed one of the first wireless internet access services, Ricochet. Microsoft co-founder Paul Allen acquired control of Metricom in 1997 through his venture capital fund and Dilworth apparently retired sometime shortly afterwards.
- Dana Krelle worked at Intel from 1983 to 1992. He then became vice president of marketing with a startup server company, NextGen, which Intel rival AMD acquired in 1996. Krelle remained with AMD until 1999. After a couple of more stops as a marketing executive, Krelle served as CEO of QuTel, Inc., from 2015 to 2020. QuTel was an apparently unsuccessful startup that tried to market intellectual property based on quantum computing technology.
- Thomas Simonet was the communications professor behind the Rider College (now Rider University) survey. Simonet, who retired in 2017 after 43 years at Rider, surveyed 200 student papers as Stewart Cheifet mentioned. And while the computer-written papers did average higher grades, Simonet and his fellow researchers said that could be due to factors other than the computer itself, such as the lack of distractions in computer labs and the simple fact that "good students may be more likely to use computers."

- Lillian F. Schwartz is the computer artist who performed the analysis of the Mona Lisa. She produced a short film in 1984 on her theory, where she postulated that Leonardo Da Vinci started with a female model and made changes to the facial features to match his own. But Milton Esterow, the former editor and publisher of *ARTnews*, wrote in a 2019 article for *The Atlantic* that Schwartz's theory was "not one that experts have rushed to embrace" over the years.
- There was at least one 386-specific operating system available when this *Chronicles* episode aired. I found an ad in the November 1986 *PC Magazine* for PC-MOS/386, an operating system made by The Software Link, Inc., touted as "specifically designed to take full advantage of the 80386's 32-bit multi-user power." The source code for PC-MOS was later released under an open source license.
- Neil Colvin will appear on *Computer Chronicles* again, participating in at least two of the annual "Computer Bowl" specials that aired during the 1990s.

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